

FAA'S 2020 NEXTGEN MANDATE: BENEFITS AND CHALLENGES FOR GENERAL AVIATION

HEARING BEFORE THE COMMITTEE ON SMALL BUSINESS UNITED STATES HOUSE OF REPRESENTATIVES ONE HUNDRED THIRTEENTH CONGRESS SECOND SESSION

**HEARING HELD
JUNE 11, 2014**



Small Business Committee Document Number 113-072
Available via the GPO Website: www.fdsys.gov

U.S. GOVERNMENT PRINTING OFFICE

88-206

WASHINGTON : 2014

For sale by the Superintendent of Documents, U.S. Government Printing Office
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WEDNESDAY, JUNE 11, 2014

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SMALL BUSINESS,
Washington, DC.

The Committee met, pursuant to call, at 1:00 p.m., in Room 2360, Rayburn House Office Building. Hon. Sam Graves [chairman of the Committee] presiding.

Present: Representatives Graves, Chabot, Luetkemeyer, Hanna, Schweikert, Collins, Rice, Velázquez, Schrader, Chu, Meng, and McLane Kuster.

Chairman GRAVES. Good afternoon, everybody. And we will call this hearing to order.

Today, the Committee is going to examine the FAA's 2020 NextGen mandate, and how it is going to affect small businesses in the general aviation community.

General aviation includes about 360,000 aircraft carrying 166 million passengers to 5,000 public airports in the U.S., many of which have no scheduled air service. More than two-thirds of these 25 million flight hours per year are for business purposes. In addition to more than 2,500 small businesses that provide air transport services, general aviation employs about 1.2 million people and contributes approximately \$150 billion to the overall GDP.

The NextGen initiative is a project of the Federal Aviation Administration designed to modernize the United States' aviation system by using satellite-based and digital technologies to make air travel more predictable, convenient, safe and reliable. At a time when many airports in the United States experience high levels of congestion and safety concerns are prevalent, the NextGen initiative offers some very positive solutions.

As part of NextGen, the FAA is mandating that by January 1, 2020, all aircraft operating in most controlled airspace be equipped with technology systems that are capable of broadcasting continuous, precise positional information to ground stations and other aircraft. This technology is known as Automatic Dependence Surveillance-Broadcast Out, or what we all refer to as ADS-B Out.

Despite the deadline, the general aviation community estimates that so far, only a few thousand out of more than 150,000 general aviation aircraft that are going to be required to equip with this new technology have done so. It seems that cost, a potential installation backlog, and uncertainty surrounding the mandate are creating obstacles to compliance among the general aviation industry.

It is important to address these challenges if we are going to reap the potential safety benefits that this new technology offers.

We are very fortunate to have with us today the administrator of the FAA, as well as a group of general aviation industry representatives and businesses who are going to be affected by this mandate, and we look forward to hearing their perspectives regarding the NextGen mandate, its economic impact on the general aviation community, and the solutions to accelerate and make possible the widespread adoption.

I would like to thank all of our witnesses, the first panel obviously and the next panel, for being here, and I recognize Ranking Member Velázquez.

Ms. VELÁZQUEZ. Thank you, Chairman Graves.

General aviation operators and the services they provide play a key role in our nation's economy. They fly to towns not served regularly by big airlines, take families on sightseeing tours, and train the next generation of commercial pilots. In fact, general aviation directly generates more than \$20 billion annually and has an overall economic impact of nearly \$80 million, employing nearly half a million workers.

General aviation's future success, however, is linked to continually improving safety across the entire civilian aviation industry. With this goal in mind, the FAA has embarked on the NextGen initiative, a large-scale modernization of air traffic control utilizing the global positioning system and other technologies. GPS provides pilots and air traffic controllers numerous advantages over the old radar-based system, namely access to precise real-time data on an aircraft's position, altitude, and speed that does not degrade in bad weather or over rough terrain.

The FAA has mandated by 2020, most aircraft will need to be equipped with ADS-B Out and equipment to broadcast GPS data to both air traffic control and other aircraft in the area. By combining these technologies, FAA hopes to improve general aviation safety records, increase utilization of air space on airports, and reduce environmental impact from noise and emissions. ADS-B is also likely to help rescuers locate survivors more quickly in the event of an accident.

However, these benefits are not free. In its rulemaking, the FAA estimated the cost of equipment to the general aviation fleet will be between \$1.3 and \$4.5 billion. Some industry stakeholders suggest ADS-B could cost \$1,000 to \$30,000 per aircraft.

During today's hearing, I am interested in learning whether these costs will come down as more equipment is certified and installation ramps up. There has also been criticism that FAA's outreach on the 2020 mandate is lacking. Since not all aircraft will need to be equipped, pilots and small operators have become confused about whether the requirements apply to them. This could result in planes unnecessarily adding this equipment or unintended violations. Providing clear, concise instruction on the mandate should be an FAA priority going forward. In addition, delays in certification are another area of concern. These delays could prevent new businesses from opening and existing businesses from complying with the 2020 mandate.

Pursuing policies that can improve safety are necessary. However, they must be data driven, clearly articulated, and with minimal delay to prevent excessive industry burdens. More sophisticated avionics technology promises a new era in civilian aviation, one that is safer, more efficient, and better for the environment. However, all of us must work together to ensure delays and costs are minimized.

I thank the panel of witnesses for traveling here today, and I look forward to their testimony.

I yield back, Mr. Chairman.

Chairman GRAVES. Our first witness today is the Honorable Michael Huerta, the administrator of the Federal Aviation Administration. In that role he oversees the safety and efficiency of the largest aerospace system in the world, and he manages a \$15.9 billion budget and over 47,000 employees. He is also responsible for leading the FAA's multi-billion NextGen initiative.

Administrator, thank you for being here, and we appreciate your testimony.

**STATEMENT OF MICHAEL P. HUERTA, ADMINISTRATOR,
FEDERAL AVIATION ADMINISTRATION**

Mr. HUERTA. Good afternoon, Chairman Graves, Ranking Member Velázquez, Members of the Committee. And thank you for the opportunity to speak with you today about NextGen and the benefits and challenges of equipping aircraft to take advantage of NextGen capabilities.

Even though it has been more than 100 years since the Wright Brothers made history at Kitty Hawk, the thrill and wonder of flight comes alive each time a general aviation pilot takes to the skies. Our aircraft are far safer today and they are much more powerful, and NextGen procedures give general aviation pilots unprecedented access to runways across America thanks to GPS.

NextGen technology brings weather and traffic information into the cockpits and gives pilots better situational awareness which enhances safety. The entrepreneurial spirit shown by the Wright Brothers, which this Committee supports, is alive and well in general aviation. The industry contributes about \$40 billion per year to our nation's gross domestic product and it creates a half million jobs. NextGen strengthens this economic engine by making our nation's airspace more efficient.

One of the foundations of NextGen is satellite-based surveillance. As we have discussed, the technical name is Automatic Dependent Surveillance-Broadcast (ADS-B). We have completed installing the ground infrastructure required for ADS-B—more than 630 transceivers nationwide. This is an extremely important milestone and I am proud of the work that has brought us to this point.

But what does this mean? What benefits does this bring to the general aviation pilot? There are considerable benefits available right now to those who equip with ADS-B long before the 2020 mandate.

We now have ADS-B coverage in remote areas where radar coverage was limited before. This includes the Gulf of Mexico, mountainous regions in Colorado, and low altitude airspace in Alaska. ADS-B helps pinpoint hazardous weather, and it gives pilots impor-

tant flight information, such as temporary flight restrictions and notices to airmen.

The highly precise GPS-based surveillance provided by ADS-B is also improving our ability to perform lifesaving search and rescue operations. Air traffic controllers have better information about an airplane's last position, thus helping to take the search out of search and rescue.

ADS-B technology allows general aviation pilots for the first time to see what air traffic controllers see. Cockpit displays show the location of aircraft in the sky around them, creating an environment of shared situational awareness. Pilots are already seeing the additional benefits of ADS-B in better weather, better traffic, and situational awareness, and we believe that they will equip to enjoy these benefits.

ADS-B Out is a foundational element of NextGen that allows us to bring these benefits and a host of others to airspace users. And I want to clarify that equipage for ADS-B Out will only be required in certain airspace. That is airspace where we require transponders today so that aircraft can be seen by controllers. Now, this, of course, includes air space located around busy airports. But if a pilot flies in uncontrolled airspace where no transponder is required today, there is no requirement to equip the aircraft.

Now, we are confident that the general aviation community sees the advantage of investing in the new technology, and ADS-B is no exception. Right now, owners of 74,000 general aviation aircraft have chosen to equip with a type of GPS technology known as Wide Area Augmentation System (WAAS). This is not required by any rule, but WAAS allows pilots to use NextGen approaches at smaller airports that do not have instrument landing systems. This opens up access to airports across the country, and many WAAS receivers already come as a package with ADS-B Out.

Nevertheless, we are very aware that increased technology requires investment, and we are doing everything we can to facilitate low-cost alternatives for the general aviation community. To meet the minimum requirements for ADS-B Out, you need three things: a GPS receiver, an extended squitter or universal access transceiver, and an antenna. You can buy just these three things, or you can integrate with other technologies and capabilities.

We have done a lot of work to certify a range of products, and companies are responding, which spurs competition in the marketplace. We encourage aircraft owners to equip soon so that they can take advantage of the benefits of NextGen. The increased accuracy, predictability, and enhanced safety that come with NextGen are taking aviation to heights that no one could have imagined in the early days of aviation. We appreciate your help in laying the groundwork for a modern air transportation system that will benefit generations to come.

This concludes my oral testimony today. Thank you for the opportunity to be here with you, and I look forward to answering your questions.

Chairman GRAVES. Thank you, Administrator.

Obviously, they just called a series of votes, and we will try to run through questions real quick and then we will go to the next.

And mine, which I will just go right into, when we passed the FAA Reauthorization back in 2012, a lot of people do not realize, but Congress put together a program to incentivize and accelerate obviously NextGen installation through FAA loan guarantees, and it has been two years and this financing mechanism has yet to be started within the FAA. And I am just curious about the implementation of that. And also, have you considered using the SBA to enter into an understanding with them or get best practices? They obviously deal with this sort of thing all the time and they are very well equipped to process them. But I would be very curious where we are in that process.

Mr. HUERTA. Sure. As you pointed out, the Act did include permissive authority to establish a new loan guarantee program, and in 2012, we had two public meetings and issued two market surveys to seek input from interested stakeholders on which NextGen capabilities are needed, and then also what would happen in the face of this financing opportunity. We also held meetings with aircraft operators and potential private partners. In December 2013, an interested private partner submitted an application to the FAA for an incentives program specifically targeted at general aviation. We are currently reviewing that application, and we are working with the DOT's Credit Council. The DOT does oversee other lending programs on the viability of the application and the program.

We do currently lack one provision, and that is the necessary appropriations authority in order to implement partnership incentive programs with a private investor. But, as we work through the application, that is something we would need to work through with the appropriators.

Now, this would certainly accelerate NextGen equipage. We believe it would do that, and we also know that there are currently many other private sector nonsubsidized lending sources that are out there to pilots, including a program that is being overseen by AOPA.

Chairman GRAVES. And we would love to help you out with that, too, as far as appropriations. We do think that it can be run much like some of the SBA programs in terms of ultimately being neutral in terms of revenues and fees being able to cover everything obviously. But we would love to work with you and work through that process because I think it is a program that is going to work. And I do not think the appropriations request has ever actually been made either, and we have to have a request from FAA, too, before we can move forward.

Mr. HUERTA. Yes. And it would be based on the scoping of the program. And since we have this single application that we are looking at, it would be based on what comes out of that.

Chairman GRAVES. Ranking member?

Ms. VELAZQUEZ. Mr. Chairman?

Okay, I would like to ask you, what do you need the appropriations for?

Mr. HUERTA. The Congress long ago recognized that authorizations for agencies to provide loan guarantee programs could have an impact on the Treasury if the potential liability was not recognized. So pursuant to the Federal Credit Reform Act of 1990, there is a requirement that loan guarantees be accounted for in an ap-

appropriations act, notwithstanding any other provision of law. So what we need in an appropriations act is essentially the ability to enter into the program.

Ms. VELAZQUEZ. But also under the act, the costs of guaranteeing and administering the loan program could be upset by fees charged to lenders and borrowers similar to the 7(a) program.

Mr. HUERTA. Sure.

Ms. VELAZQUEZ. My question to you is have you ever contacted SBA so that you could draw from their experience in this area?

Mr. HUERTA. Yes. And we have contacted everyone that administers guarantee programs, and essentially, what the appropriation deals with is not specifically an appropriation of the fee.

Ms. VELAZQUEZ. Okay.

Mr. HUERTA. What this is an appropriation for is a risk premium as for any lending program in the situation which could emerge of a loan default or something like that. That is what we need the authority for.

Ms. VELAZQUEZ. Okay. What happens if a small operator cannot get equipped in time due to conditions out of their control, like supply chain issues or installation backlogs?

Mr. HUERTA. Well, as of today, we have no installation backlogs, nor do we have a backlog in certifying repair stations to do the installation. We are still five and a half years ago, and it is for that reason that we encourage people to get ahead of this so as to ensure that we do not have an installation backlog as we get to January 1, 2020. And we do think there are benefits for early adopters because they are able to take advantage of the safety benefits, as well as the operational benefits that come from deployment of ADS-B. We do not want people to wait.

Ms. VELAZQUEZ. Okay. FAA's strategy right now is to bring everyone into compliance at roughly the same time. Can you explain the pros and cons of this approach?

Mr. HUERTA. Well, the requirement was implemented in 2010, and it provided a 10-year implementation period for commercial, non-commercial, all users of the national air space system to be equipped with ADS-B Out by 2010. And the reason for that is that you can only have the safety benefit, as well as the foundational efficiency benefits that come through ADS-B if everyone is equipped. Otherwise, there is no incentive because you will have a moving target. So you need everybody in the program in order to get the benefits across the national air space system as a whole.

Ms. VELAZQUEZ. Okay. Thank you.

Thank you, Mr. Chairman.

Chairman GRAVES. Mr. Collins?

Mr. COLLINS. Thank you, Mr. Chairman. I will be relatively quick.

As a VFR general aviation pilot, I can tell you, you have answered my questions. My biggest concern would be the exemption for someone flying in uncontrolled airspace. I think that is necessary. You have answered the question. I also think your 10-year rollout is quite reasonable, and the fact that you can get benefits today, I can imagine a lot of people would go ahead and move forward. And there is always a cost issue to most anything. I do not think the cost here—for most people flying airplanes, there is a

basic cost in that hobby, and while there is a cost here, I do not think that is going to be a detriment to those who want to continue flying, and I think the safety far outweighs it. So I applaud everything you are doing there.

But let me bring up one thing maybe a little bit off topic. I was county executive of Erie County when Colgan Flight 3407 went down a mile from my house. That was about five years ago. And as frustrated as I was and others with some of the FAA delays on the safety issues that came out of the Airline Safety and FAA Extension Act in 2010, they are mostly now implemented. The pilot fatigue, the pilot training, and the new licensing requirements are all now implemented and that is good, but could you quickly update me on the last remaining piece, which is the pilot record database? In this case, the pilot had failed several check rides. He did not disclose that on his application to Colgan. There was no way for Colgan to verify that, in fact, this particular pilot—and it was 100 percent pilot error—crashed because of the lack of knowing that he was frankly just not qualified. Can you update me, and those in Western New York especially, where we stand on the database?

Mr. HUERTA. Sure. To go back to the beginning, the Act required a 90-day period to begin the development on the pilot records database, and we did meet that. We established an aviation rulemaking committee in February of 2011, which delivered their report to us later that year in July. In August, we issued what we call an info. That is an information for operators to ensure that the industry is aware of the need to retain records, all in anticipation of the development of the planned pilot records database. In August of 2012, we conducted two IT proof of concept tests to determine whether we have a workable technical solution because this is information that comes from a whole lot of different sources. Based on those results, we did initiate a rulemaking and are currently working toward the development of the notice of proposed rulemaking, which we hope to publish soon.

Mr. COLLINS. Any guestimate on when this might be finished?

Mr. HUERTA. I will have to take an IOU and get back to you.

Mr. COLLINS. Yeah, could you?

Mr. HUERTA. Yes.

Mr. COLLINS. I get questioned about that all the time.

Mr. HUERTA. Sure. Okay.

Mr. COLLINS. I yield back, Mr. Chairman.

Chairman GRAVES. Mr. Schrader?

Mr. SCHRADER. Thank you, Mr. Chairman.

Thank you for coming, Administrator. I appreciate it very much.

Can you describe briefly your outreach to the industry before the mandate came out and stuff so we have a clear impression of how the stakeholders are involved?

Mr. HUERTA. We are working with the various industry groups that represent the segments of the general aviation industry. You will be hearing from them in the second panel here on this hearing. That includes the manufacturers who represent the avionics manufacturers, as well as many of those that are in the business of the installations. We are working with the electronics industry, who

represents both users, as well as repair stations that supply it, the Aircraft Owners and Pilots Association.

Mr. SCHRADER. I was referring to before the mandate and stuff.

Mr. HUERTA. Before the development of this it was done through the standard public process that we would do in terms of outreach for any rule that we would develop and any mandatory notice and comment in consultation with stakeholders.

Mr. SCHRADER. Questions come up about why not use the SBA for the loan program and you indicated that there are a bunch of agencies that do have loan incentive programs. The SBA I would respectfully suggest is uniquely set up to do that sort of thing. Rather than have the agency itself recreate another process or bureaucracy within itself, it might be smart to contract out with the SBA or pick an agency, but SBA is small business friendly. They get that. They have a lot of experience with the guarantee-type programs. Have you actually talked to the SBA and gotten involved with them in a discussion along these lines?

Mr. HUERTA. I have not but our credit team and our finance team have talked extensively with the government partners, you know, about how to structure this. But to be clear, we are not proposing to set up a bureaucracy or an office to do this. The application we have is from a private lending entity that we would simply be providing the guarantee behind.

Mr. SCHRADER. Okay. And I am fine with a private entity as long as they are reputable and will follow through on that. I just would suggest it might be smart to have at least someone to compare the two, make sure to compare apples with apples frankly. But I think it is an option there.

Mr. HUERTA. Sure.

Mr. SCHRADER. And then the request for the appropriation authorization. That is a technicality it sounds like. When do you think given, working with the provider, maybe the outreach here to the SBA, when do you think that might occur?

Mr. HUERTA. It has to be done in an appropriations act, and so it is however that——

Mr. SCHRADER. It is probably next year is what you are suggesting unless there is a specific bill that deals with this alone?

Mr. HUERTA. Probably. Yes.

Mr. SCHRADER. Okay. Okay.

And then I guess I just want to thank you personally for how the agency works. I have had opportunity to reach out to the agency on more than one occasion. We get responses. We get telephone calls back. The contract tower program is a big deal for a lot of small airports around the country, a lot of general aviation folks. And we had an airport in Aurora we were concerned about personally, but I think you guys played straight with us, talked about what was in the appropriation bills or not and how that might happen, and I just appreciate the way the agency conducts itself and wish other agencies would do the same thing.

With that, I yield back, Mr. Chair.

Mr. HUERTA. Thank you.

Chairman GRAVES. Thank you very much.

With votes, we will go ahead and move to that. If any other members have a question for the administrator, please submit it and I will make sure you get it.

Mr. HUERTA. Thank you.

Chairman GRAVES. And I would hope to—I do not know if you can leave one of your staff around to hear the industry experts on the next panel.

Mr. HUERTA. Absolutely. We will.

Chairman GRAVES. That would be fantastic. And we appreciate you coming up, and I apologize for the votes, but thank you very much for taking the time.

Mr. HUERTA. Thank you, Mr. Chairman.

Chairman GRAVES. And we will go ahead and seat the next panel while we are in recess, and we will be gone for a little bit.

[Recess]

Chairman GRAVES. All right. We will call the hearing back to order. I apologize again for the vote series in the middle of this. But our first witness today is Ms. Paula Derks. She is the president of the Aircraft Electronics Association, which is based in Lee's Summit, Missouri, which I am very proud to represent.

As president of AEA, Ms. Derks presides over an organization that provides regulatory representation, training, and member services to more than 1,300 general aviation and electronics entities in 43 countries. She was named president of AEA in 1996 after beginning her career there as managing editor of Avionics News.

Thank you for being here. I appreciate your testimony.

STATEMENTS OF PAULA DERKS, PRESIDENT, AIRCRAFT ELECTRONICS ASSOCIATION; TIM TAYLOR, PRESIDENT AND CEO, FREEFLIGHT SYSTEMS, INC.; BOB HEPP, OWNER, AVIATION ADVENTURES; KENNETH BUTTON, DIRECTOR, CENTER FOR TRANSPORTATION, POLICY, OPERATIONS AND LOGISTICS

STATEMENT OF PAULA DERKS

Ms. DERKS. Chairman Graves, Ranking Member Velázquez, and members of the U.S. House Committee on Small Business, thank you for the opportunity to appear before you today to speak about the benefits and the challenges of the NextGen mandate on the general aviation industry.

My name is Paula Derks, and I am president of the Aircraft Electronics Association, and as Congressman Graves said, we are an international organization representing nearly 1,300 companies of which nearly 80 percent are small businesses. Included in our membership are nearly 200 avionics manufacturers, many of whom are producing systems to meet ADS-B Out requirements.

Our largest category of membership is the 900-plus government-certified repair stations with approximately 700 of those located here in the United States and certified by the FAA to maintain and install avionics, and an additional 200 repair stations in more than 40 countries around the world.

My comments today will focus on three primary areas. Number one, industry's ability to meet the mandate. Number two, certifying new equipment and receiving field approvals on the installation. And number three, the refocused effort needed from the FAA lead-

ership to expedite implementation of this safety-enhancing technology and sign off on the congressionally-authorized financial incentives for the aircraft operator.

Right here today on this date, repair stations have the capacity to perform ADS-B installations at a rate necessary for the expected 160,000 general aviation aircraft to comply with the mandate by January 1, 2020. Obviously, demand is expected to increase as the deadline nears, and a recent survey of our membership indicates that more than 75 percent of the 700 U.S. repair stations will expand and hire new employees and new technicians and support staff. This alone is job creation.

But industry has received mixed signals from the FAA in regards to the mandate, and this leads to confusion, rumors, and mistrust of the very agency charged with implementing the Next Generation Air Transportation System in our nation.

As you might imagine, when it comes to being forced by a government mandate to spend hard-earned, personal cash to upgrade when benefits to the consumer have not yet been fully realized, it is not an easy sell. But since the mandate was first announced in 2010, my association, along with our sister associations, have worked hard to educate industry and encourage early equipage.

From day one, Administrator Huerta's office has been a vocal proponent of NextGen. They have promised a reasonable transition, and they have worked to make sure the ground infrastructure is in place, only to have their efforts derailed by the back office of the FAA, whose individual interpretation of the rules, excessive micro-management on projects, and personal opinions compete with the overall objectives of this program.

Rumors are swirling that the mandate will be extended. These rumors and mistruths create a very confused consumer. Several of our repair stations tell us that their customers, the aircraft operators have decided to wait until the last minute to equip because they assume the FAA will operate as usual, with delays, and they will have to extend the deadline to equip.

And for operators who have decided to equip early, the FAA is still a constraint. We have a member in Las Vegas who supports a helicopter fleet operator wanting to equip a fleet of 90 helicopters. He currently has the correct ADS-B equipment installed, but because his aircraft has not been FAA "approved" for ADS-B operations, he cannot turn the system on.

Keep in mind, the systems he is installing in this fleet have already been approved by the FAA in thousands of airplanes, but because this is a fleet of helicopters, the approvals do not count. So the penalty for this operator, who is willing to early equip, is experiencing six months of costly administrative burden and tens of thousands of dollars in certification fees.

To avert a chokehold as early as 2016, the certification and approval process must be streamlined. The AEA is also helping promote the NextGen GA Fund. This fund is designed to take advantage of the public-private partnership funding authorized by Congress. It creates low interest, privately-funded government back loans for aircraft operators. The lack of FAA's willingness to embrace the fund is a testimony to the cancer that has reaped havoc on the agency for the past decade. The agency seems to have a cul-

ture of “cannot,” rather than a culture of “can do.” We simply ask the FAA administrator to restore the culture of “can do” to his agency and encourage his agency and encourage his workforce to work with the industry. This should be a partnership with a shared goal, and that being safety and efficiency. It is this type of historical culture that has created the greatest general aviation industry in the world.

In closing, the challenges that we ask Congress to address include an effort by the FAA to incentivize aircraft owners by immediately signing the loan guarantee certificate for the NextGen GA Fund, streamlining the certification and approval process, and restoring aircraft owners’ confidence in the FAA that this deadline will not be extended and their money will be well spent.

Thank you for this opportunity to testify on behalf of the general aviation electronics industry.

Chairman GRAVES. Our next witness is Tim Taylor, who is the president and CEO of FreeFlight Systems, which is an aviation manufacturing company based in Texas that is developing innovative solutions to assist in NextGen compliance.

Mr. Taylor has 35 years of leadership experience in the aerospace and defense industries, and prior to starting FreeFlight Systems, he was the CEO of Elbit Systems of America, a global defense electronics and commercial aviation company. There, he pioneered new technology-based systems for customers, including Gulf Stream Aerospace and Federal Express. Mr. Taylor is testifying today on behalf of the General Aviation Manufacturers Association.

We appreciate you being here and look forward to your testimony.

STATEMENT OF TIM TAYLOR

Mr. TAYLOR. Chairman Graves, Ranking Member Velázquez, and other distinguished members of the Committee, my name is Tim Taylor, and I am president and chief executive officer of FreeFlight Systems. Today, I have the privilege of also representing the General Aviation Manufacturers Association, and I am honored to provide testimony to the Committee on their behalf.

I appreciate the opportunity to discuss today the benefits of the nation’s transition to NextGen for general aviation and to highlight the importance and ability of industry to meet the FAA’s 2020 Automatic Dependent Surveillance or ADS-B Out mandate. As the leader of a small aviation manufacturing business, I thank the Committee for holding this hearing and look forward to describing how NextGen avionics, specifically ADS-B equipage, is readily available, affordable and easy to install.

FreeFlight Systems designs, manufacturers, and supports electronic systems that enable the NextGen air traffic management transformation. We certified our first ADS-B Out radio in 2011, obtained our first installation approvals in 2012, and have delivered around 1,000 ADS-B radios and around 3,000 ADS-B position sources since then.

As a small business, we made the investments, over \$3 million, upfront to allow aviation operators the ability to meet the FAA’s 2020 ADS-B mandate. In short, we have already accomplished the “heavy lifting” required to make our solutions readily available, af-

fordable, and easy to install. We are seeing rapid acceleration today in the adoption and installation of ADS-B systems in both airborne and airport surface vehicle applications.

FreeFlight Systems does all this as a small business in Texas that currently employs 53 people. We either perform or source our manufacturing in the United States, predominantly in Texas, but we are also part of the global aviation industry, exporting around 40 percent of our products.

The potential benefits of NextGen to the aviation community are significant. The transformation enables improved safety, increases the capacity of the airspace system, and reduces the cost and complexity of air traffic control. For GA operators, many of these benefits, such as access to weather and traffic information, or ADS-B In, are immediately available upon appropriate equipage, but realizing the full-potential of NextGen across the national airspace system will require significant additional work by the FAA.

The more airplanes that equip, the more dramatic the improvements in capacity and safety become. The full potential can be realized only when all aircraft in controlled airspace are equipped, which the FAA has mandated by January 1, 2020. The rule and mandate were established early in 2010, giving aircraft operators 10 years to equip. Equipment manufacturers have had longer. The system architecture was finalized in 2007 and the rules and requirements have not changed substantially since then. The ground infrastructure for the system is largely deployed and is operational across the country. There are no regulatory or infrastructure barriers to full equipage to meet the mandate. This long-term stability is essential if small businesses are to participate in the NextGen transformation.

For the light end of GA, ADS-B equipment can be relatively inexpensive and easy to install. FreeFlight Systems offers complete solutions today at a list price that is less than \$4,000. That is what it looks like as a small system. And we are seeing installation times that are typically in the 20 to 40 range, for a total cost of \$6,000 to \$8,000. This estimate includes rule compliant ADS-B Out, as well as ADS-B In for aircraft that have no modern avionics at all. In newer aircraft, ADS-B In, for example, can utilize existing display to show beneficial situational awareness. In an older aircraft that has not seen a new piece of avionics since the 1960s, ADS-B can simply utilize an iPad.

For NextGen to be effective, however, systems users need to adopt the technology. For the system to work to its full potential, every aircraft that enters controlled airspace needs to meet minimum equipage standards or it will disproportionately disrupt operations. A mandate is the only way to ensure that happens and to ensure that everybody who invested in the new system, industry users and government, get the return they deserve on the investments that they have made.

In our view, the best incentives from government and industry are already in place: infrastructure, a firm schedule, stable requirements, and aggressive pricing. However, there is always more that could be considered.

One area of concern is the inconsistency in the application of certification standards across different FAA branches and regions.

Many NextGen programs are being given priority in modification approvals, but strong leadership and training can address these inconsistencies, reducing delays, and increasing the number of installers willing to aggressively price and perform ADS-B installations.

Low interest, government-backed financing has been discussed in the marketplace and authorized by Congress and is popular among FreeFlight customers. Congress should examine how this can be made to move forward.

The timely introduction of NextGen technologies is vital supporting the safe and efficient operation of our nation's airspace system and to maintaining U.S. global leadership in aviation. Any wavering or mixed signals hurt NextGen progress, safety, and small businesses that are playing by the rules.

Thank you for the opportunity to testify this afternoon, and I look forward to answering any questions that you may have.

Chairman GRAVES. Thank you, Mr. Taylor.

Our next witness is Bob Hepp, who is a retired Army lieutenant colonel and owner of Aviation Adventures, which is a flight training school based in nearby Manassas. After graduating from Bowling Green State University and obtaining his private pilot certificate in 1977, Mr. Hepp joined the Army, and in 1989 started Aviation Adventures with one aircraft operating off a public ramp in Laughton, Oklahoma. Aviation Adventures has won the Aircraft Owners and Pilots Association Outstanding Flight School Award twice and won its 2013 President's Choice Award for innovative contributions to the flight training community.

Mr. Hepp is testifying on behalf of AOPA, and we appreciate you being here and look forward to your testimony.

STATEMENT OF BOB HEPP

Mr. HEPP. Thank you, Chairman Graves, Ranking Member Velázquez, and members of the Committee. I am Bob Hepp, the owner of Aviation Adventures, a flight school with locations in Manassas, Warrenton, Stafford, and Leesburg, Virginia.

Our staff of 41 employees provides flight instruction at all levels from initial flight training through the Airline Transport Pilot certification. We also provide rental aircraft.

I am also representing the Aircraft Owners and Pilots Association (AOPA). I have been a member of AOPA since 1981. AOPA's mission is to effectively represent the interests of its more than 350,000 members as aircraft owners and pilots concerning the economy, safety, utility, and popularity of flight in general aviation aircraft.

My testimony today will cover the following points:

One, the general aviation community has long supported the move from ground-based to satellite-based navigation. However, at this time, the benefits associated with the FAA mandate are unclear and inadequate for many general aviation users.

Number two, the FAA's mandate to equip ADS-B Out by 2020 is costly and will be prohibitive for most small flight schools, businesses utilizing aircraft, and recreational aviators.

Three, providing low-cost loans for GA equipage and leveraging existing cockpit technologies, such as handheld devices, can help

move NextGen modernization forward without imposing unmanageable burdens on small businesses.

For most general aviation pilots, there is no direct benefit of the ADS-B Out mandate. Complying with the mandate will simply allow pilots to continue using the national airspace system that they are using today. Complying will be prohibitively expensive for many small aviation businesses, including flight schools. Aviation Adventures owns and operates 39 aircraft. I estimate that the total cost to equip these aircraft for minimal compliance with the ADS-B mandate will be \$312,000, a major investment for small businesses and many flight schools, one that many flight schools will be unable to make.

Unlike investing in additional aircraft or facilities, the money spent on ADS-B Out equipment will not bring a direct return because it will not increase our customer base, will not allow us to serve more clients, provide new capabilities, or otherwise help grow our businesses. For that reason alone, it is not currently a sound business decision to equip early.

Continuing uncertainties about exactly what the FAA will ultimately require to fulfill the mandate and the tendency of technology prices to drop over time are further disincentives to equip early. We have already seen a decrease in prices for ADS-B equipment, just as Mr. Taylor just showed us, since the mandate was finalized in 2010, making it in the best interest of business owners and aircraft owners to wait before making that investment.

Because of the high cost and low return on equipping for the 2020 mandate, general aviation operators need a little assistance. The establishment of a fund to continue low-cost, federally guaranteed loans to equip GA aircraft could provide the financing needed to meet the mandate.

Handheld devices currently provide ADS-B In information, significantly enhancing safety at very nominal cost. Many aircraft operators are already using handheld devices in the cockpit, and similar technology could be used to provide ADS-B Out.

In conclusion, I believe in its current form, the current ADS-B Out mandate fails to provide affordable benefits and support for general aviation operators. We look forward to working with the FAA to help develop affordable ADS-B solutions for general aviation operators and to help the FAA in their efforts to educate the general aviation community on the benefits and options provided by these solutions.

On behalf of the 41 employees of Aviation Adventures and the more than 350,000 members of AOPA, I appreciate your leadership in addressing the concern of the GA industry and also to continue to help small businesses thrive and grow nationwide.

Thank you for the opportunity to appear before the Committee.

Ms. VELAZQUEZ. I am sorry. I am kind of lost. I am just working on the questions as I listen to you.

Yes, Mr. Chairman, it is my pleasure to introduce Kenneth Button. He is the university professor of Public Policy at George Mason School University, where he is the director of the Center for Transportation Policy, Operations, and Logistics. He has published or has in press some 80 books and over 400 academic papers in the field of transportation economics, aviation policy, and related sub-

jects. Professor Button is the editor of numerous academic journals in the fields of aviation and aerospace policy, tourism, and transportation. Prior to coming to George Mason University in 1997, he served as a transportation expert for the OECD and taught at several universities throughout the world. Welcome.

STATEMENT OF KENNETH BUTTON

Mr. BUTTON. Thank you very much, Chairman Graves, Ranking Member Velázquez, and Committee members.

We are clearly going through an age of technical change. We are moving from a technology in aviation, which is probably 80 years old, to one which is really 20 years old. I do not mean that in any insulting fashion. We want a technology which is robust. We do not want today's technology.

This change is clearly causing friction. It is not easy. My recent experience has mainly been in Europe. We have something like 35–40 countries trying to move forward in a single European skies, very similar to the NextGen initiative here. I would warn of delaying any introduction of ADS in this country. Europe has done this so far once. There were plans in Europe to introduce ADS for new aircraft from 2013, a retro fit from 2015. That has been pushed back for two years, and probably another pushback is coming. That is not the way to incentivize introduction of new technology. So I would hope people will stick firmly to the 2020 deadline. I think it is very important that this is done.

In terms of the benefits, the pros, if you like, of ADS, I think there are safety benefits but they increase exponentially as more people adopt the technology. It is no good having one or two people. And in the long term, I think one has to think of a full arrangement including ADS In as well as ADS Out.

Aviation is growing in this country, and giving the licensing I believe it was yesterday of a drone service in Alaska, we are going to see unmanned vehicles out there as well in larger numbers, I believe, over the next 20 or 30 years. And there is a need to actually integrate the two sectors, the manned and the unmanned. And I think moving towards ADS is one element in that.

In terms of the costs, which I think can be questioned in some senses, it is not an easy thing to adopt a new technology. It does cost money. The FAA has put money into the ground facilities. That is not a small sum of money, and the airlines, the commercial airlines are putting equipment in and the general aviation community area. I think that the costs sometimes which are missed in the general aviation community are the time it takes to put this equipment in. A lot of general aviation does involve commercial activities—air taxis, training activities, business jets, and there is a downtime equipping the new technology. So the cost is not simply the financial cost of acquiring the technology; it is also the implementation and setting up of the arrangements to have it installed.

There are other issues which I think have been discussed. I want to spend a couple of minutes though just talking about the transition. Transitions into any new technology have two elements if they are of any use, a stick and a carrot. The stick in this case is you have got to have it in place by 2020. Bang. The carrot it seems to me is the problem. The initial ruling was made in 2010. That is

four years ago. There should be some initial thought about how to incentivize early uptake of that point. You do not wait until half-way through and then move forward to a situation of offering loan guarantees, et cetera, to help people adopt the new technology. There is a problem here. Partly, obviously, there seems to be some difficulty with the FAA implementing the current arrangements, but one would hope perhaps one would move more rapidly at the early stages to get people to equip much more quickly so you do not get any potential backlog.

Other countries are doing things differently and it is worthwhile looking at them. I am not saying they are better. I personally do not think that they are. Canada tends to be using a sort of geographical outward movement taking airspace which is currently under no radar control and introducing ADS there and expanding it geographically outwards. Other countries, I believe Australia, are trying to expand it downwards, higher flights requiring equipping before flights at lower levels. So there are options. I am not all together sure they actually are better than the ones in the U.S. I think the bigger bang approach here where everyone has to have it in controlled airspace is a wise and sensible one. My concern is quite simply that the incentive structure has not been developed quite as thoughtfully as it might have been. I appreciate within that there are budgetary constraints at the macroeconomic level which would slow this down, but I one would hope that the FAA will now move forward more rapidly and get moving on putting in place the finance which is going to be available to help with the adoption of ADS.

Thank you very much.

Chairman GRAVES. Thank you very much.

We will move to questions, and we will start with Mr. Hanna.

Mr. HANNA. Thank you.

There is pretty much unanimity here that—and who can blame anyone for believing that bureaucracies will not meet deadlines, make rules clear, put people in a position where they spend money that they find out that they did not have to, or did not have to in time, or to your point, Ms. Derk, technology changes.

So the biggest thing you are all asking for is some degree of certainty. There are plenty of ways to finance things. We could do it through the Small Business is one of them. It strikes me that you cannot blame people for waiting until the last syllable of recorded time with our history on most everything in government. I am a pilot. I certainly would not go out and—you know, I bought an ELT that I was required to buy to transfer frequency. Sam knows about it, and I still do not need the old one, and it is years. So, and I can really appreciate Mr. Huerta's point, the administrator, who is moving forward to do his job and it is just—it is more about setting deadlines, meeting deadlines, having guarantees, and Flight School has some 32 planes you said?

Mr. HEPP. Thirty-nine.

Mr. HANNA. Thirty-nine planes. You know, \$300,000 is a lot of money, but let us be honest. You need to train all those pilots to use this equipment because it is going to be what they are going to use. So certainty for you makes a big difference, too. And you can probably do it easily over time, but much less easier if you put

it off, but you are not really sure that you do not have to or could not put it off.

I wish I had a question to ask you. I just sympathize with all of you. I wonder though, Mr. Hepp, because you are right in the thick of this. You are in a tough industry training people, very expensive feet and a lot of people, so you are probably the person who is most detrimentally affected being in the low end of GA with all due respect. So you are kind of prepared to do this but you are concerned that you are going to do things that will not benefit you that cost you a lot and maybe the FAA will make a mess of it. Would you like to respond?

Mr. HEPP. That is pretty much the crux of the issue is that as Ms. Derks pointed out, like anything else, if you buy a flat screen to put up in your house today, the only thing you are going to be guaranteed is that next year or two years from now you can pay half the price for that same TV. And the same thing is going on in electronics, just like Mr. Taylor just pointed out to us. So there is no incentive to wait. The only thing that is going to happen is that capabilities are going to go up, the prices are going to come down, the mandate date may shift backwards. It may change. They may abandon it. They had the microwave landing system a number of years ago that they started and it went away. So the only thing that we know is that what we are dealing with today is not going to be what it ends up in final state. So there is no incentive right now for an operator to equip early but the benefits come from, as Professor Button pointed out, from everybody going out there and equipping early because it does not do any good to have that technology available in your cockpit if there is nobody out there transmitting the ADS-B Out signal to be received.

So that is the issue that we are at, and if everybody waits till the last minute, we are not going to have the capacity—

Mr. HANNA. But every incentive is pointing to the notion that people should wait till the last minute—

Mr. HEPP. Exactly.

Mr. HANNA.—because of the way the process is not just rolled out, but to Ms. Derks's point, the way technology is put together, the way pilots can—I mean, I cannot tell you the number of GPSs I have owned in my life and there is always something new, fancier, better that really is better. I am just glad I am not you today.

Mr. Taylor, do you want to—

Mr. TAYLOR. Yeah, I would like to talk to that a little bit.

I am in the technology business. I am the GPS guy. The GPS in this thing—this is a UAT. This is a transceiver with GPS in it. The GPS in that is a 2003 kind of vintage WAAS GPS. It has been updated a little bit in the last couple of years, but that technology is mature and I cannot make—that particular GPS, I cannot make it any smaller. I cannot make it any less expensive. And certify. There are certain minimum standards we have to meet with this kind of equipment that you cannot go below. This is a primary air traffic control device. You put it on your aircraft and from that moment on other aircraft around you, the rest of the world is depending entirely on what comes out of this box to make decisions about separation, movement of aircraft, and so on. So the standards that you have to meet are not going to drop—they are not going to drop

below the standards of day-to-day. They were well thought out. They were well established. I cannot build this any cheaper. I am telling you. I cannot build this any cheaper than I am selling it today. This is priced—I am buying materials in quantities of 1,000. I am not selling in thousands. I am selling in hundreds, so I am taking risks on that. But that is the price. The cost is not going to go down of the equipment.

And I think in terms of the rules themselves, in my testimony I am asking the rules not to change. I think the rules should not change. I think the rules will not change. I think it would be very nice to really hear the FAA in some consistent and concrete way tell us.

Barriers to equipage, we are seeing people equip.
Just one more little thing. I am sorry.

There are benefits today, by the way. So the FAA provides to users of this equipment traffic information, weather information. That comes today. You do not need everybody to equip to that. That happens today. For flight school, we can provide you fleet tracking, so you can use the ADS-B technology to track the assets that you have flying for safety, for fuel efficiency, for many reasons. So the raw technology is really just a cornerstone of many, many, many exciting applications, many of which are available today.

Mr. HANNA. My time is expired. Thank you for your indulgence.
Chairman GRAVES. Ms. Velázquez?

Ms. VELAZQUEZ. Professor Button, you mentioned that other countries have taken a different approach to implementing satellite-based air traffic control. For example, Canada's geographical spread system. Do you think a different approach would have fewer negative impacts than FAA's current strategy?

Mr. BUTTON. Probably not. I think that the big thing you have to remember about the United States is the sheer scale. It dwarfs any other general aviation market in the world. There are some figures in my written documentation to give you an impression of this.

I think when you have a large market of this kind you really have to go for a big bang approach. It is pretty heterogeneous. Markets interact with one another and I think of these as markets. I am an economist by training, so I think the U.S. has actually been very wise in taking a big bang approach. It is not totally big bang because uncontrolled flight space does not require ADS. It does not have complete coverage of the system, but it is fairly reasonable I think given the nature of the country, given the nature of general aviation here.

Ms. VELAZQUEZ. Thank you.

Ms. Derks and Mr. Taylor, you both mentioned rumors that the FAA may delay the 2020 mandate, yet the administrator today stated that that will not happen. I would like to hear why you think there will be a delay?

Ms. DERKS. As of today, we do not know that there will be a delay. I am simply expressing that those are the stories and the rumors in industry right now that based on FAA's past history, there most likely will be a delay. In the past five decades, I do not know of one avionics mandate that has not received an extension by the FAA. And I think I can speak for Mr. Taylor, we are both

asking for the FAA not to extend this mandate; to try to meet the January 1, 2020 mandate and work with industry to help us educate the consumer as well.

Ms. VELAZQUEZ. Okay.

Mr. TAYLOR. Just to add, we hear it from customers. This is where we hear the rumor. When we are talking to customers about equipping, then one of the reasons that they give is the reason you gave. The FAA has never successfully brought one of these programs in on time. And that is the concern.

I agree with Paula. The FAA seems to be doing all the right things in terms of providing the framework, providing the rules. We are not seeing any sign that they are wavering. But a couple of years ago I was hearing them shouting from the rooftops that there will be no waivers, no exceptions. You have got to do that. I have not heard that so much recently, so it would be nice to hear that shouting from the rooftops again.

Ms. VELAZQUEZ. Okay. So you all touch on the need for a loan guarantee program to help general aviation operators purchase equipment. Is there any data available to support this assertion?

Mr. TAYLOR. I can give you a very small sample. We are a small company. So two weeks ago we made 70 outgoing calls to people who had asked about the system and who we had quoted to but had not purchased. And we asked them, are you going to approach this? What is the decision? Seventeen of them purchased, which was wonderful, by the way. Ten said they were waiting for the loan guarantee program.

Ms. VELAZQUEZ. They are waiting for the loan guarantee program.

Mr. TAYLOR. It had been announced. We had announced it. We thought it was happening. So that was it. And then the others were various not decided yet.

Ms. VELAZQUEZ. I am troubled with the fact that in reference to the question made by the chairman and followed by me regarding the loan guarantee program, he stated that they needed appropriation language or an appropriation. And when I read the statute, the reauthorization, it says "Subject to the ability of appropriated funds, the secretary may use a financial instrument to facilitate public-private financing for the equipage of general aviation and commercial aircraft. To the extent appropriations are not made available, the secretary may establish the program provided the costs are covered by the fees and premiums authorized by the section."

So what it means, Mr. Chairman, is basically that they have the authority to create a program that is offset with the fees. So we should send a letter to the administrator asking for clarification. And if, in fact, there is no appropriation, the fact of the matter is that they have not submitted a request for such an appropriation. So clearly, the message is that they have no intent to create such a program. The authority is there and we should request clarification or a certain date as to when they are going to have a program up and running.

I would like to ask Professor Button, as you know, congestion around airports results in delays and reduces safety if air traffic control cannot accurately track flights both in the air and on the

ground. How does ADS-B technology help controllers better manage traffic around airports?

Mr. BUTTON. Well, in a number of ways. One is you have immediate information, the current system of primary surveillance where you send the beam out and it bounces back. There are gaps in the information. So you have got more continuity in the information flow you have got.

There is the ability also to see them fairly easily. I think the main advantage will come with congestion when you get both a full implementation of ADS In and Out. So the airlines can come through and they can sort of interact with one another. It is a difference between commercial aviation—scheduled commercial aviation I should say accurately, and other forms of aviation in the sense that they are in sense operated from the ground. They have ground controllers who maneuver the commercial aircraft we fly in to put them in order for landing to make connections and so on. That would be improved. UPS is clearly using it in some of the freight carriers which is advantageous to them.

General aviation, not many places are going to have a huge impact on congestion I do not think because a lot of the flying is done at relatively small airports. Not always, of course. So the main gains I think here with congestion are probably more with the commercial scheduled carriers because they can manage their schedule better. But, of course, there are some airports which do have a quite significant general aviation, particularly business aircraft coming in, and there again, the controllers have more information exactly where things are.

And the other factor, I think, is the weather information we keep forgetting. There is some free information in this. Weather information and other information of that kind can also affect decisions of pilots of how to approach delayed flights and so on which can be helpful in congestion control.

Ms. VELÁZQUEZ. Thank you.

Thank you, Mr. Chairman.

Chairman GRAVES. Mr. Luetkemeyer?

Mr. LUETKEMEYER. Thank you, Mr. Chairman.

A lot of the questions I had have already been asked here, so let me just start with Mr. Hepp, you mentioned a while ago something about a handheld device. Has the technology gone to where it is a handheld device now or something smaller and easier to handle, cheaper, or something like that? Are we headed that direction?

Mr. HEPP. What is available right now is ADS-B In technology in a handheld form.

Mr. LUETKEMEYER. Do you consider that handheld?

Mr. HEPP. This is an installed—this would go actually installed on the aircraft, but apparently, there are applications, iPad applications out there ForeFlight, Garmin Pro, several others that then can be mated with an antenna using either Wi-Fi or Bluetooth technology, and that antenna is entirely—it has got a self-contained battery. You just turn it on, set it someplace where the antenna has a view of the sky, and you get all of the ADS-B In information that is available. So any aircraft that is equipped with ADS-B Out technology, you will see that aircraft pop up as traffic on an iPad screen. And also, the weather information that Pro-

fessor Button was talking about is available from the ADS-B sites that are now—I believe that array of sites is fairly robust in the U.S. So weather information then is also immediately available to pilots at a very low cost. The antennas out there currently run in the neighborhood of \$800, and then the iPad and the applications for the iPad are somewhere between \$75 and \$150.

So for that minimal investment, you can get all or most of the benefits of ADS-B on the inside, but the requirement is for ADS-B Out to broadcast your position information so that other ADS-B users with an In capability can see your position.

Mr. LUETKEMEYER. Okay.

Someone mentioned a while ago something about drones. Do drones have to have this device? Mr. Button, is that you?

Mr. BUTTON. Very good question, actually. I have no idea. One would hope they probably do. There has only been one licensed grantor as far as I understand and that was to inspect pipelines in Alaska. That was yesterday, I believe. But clearly, the FAA is looking at drones very carefully and they presumably—I have not thought about this—come under general aviation. Hot air balloons do, so drones presumably might have to.

Mr. LUETKEMEYER. Mr. Taylor?

Mr. TAYLOR. There is work ongoing right now on this, and the FAA recently set up five different test sites across the country to manage integration of UAVs and manned aircraft at different levels. One was in Texas. A&M is doing it. One is in Nevada. And I think you will see that technology will become part of the solution for putting unmanned vehicles in the airspace. But in terms of—

Mr. LUETKEMEYER. So it is not required right now?

Mr. TAYLOR. It is an airspace rule, so the way the FAA and—we are on the Joint Government Industry Working Group for ADS-B, and the way it has been explained in that working group is that it is an airspace rule. So it does not matter if you are an F-16 or a UAV or a home build.

Mr. LUETKEMEYER. Gotcha.

Mr. TAYLOR. You are going to have to comply with the rule to operate in that part of the airspace.

Mr. LUETKEMEYER. Very good.

Mr. TAYLOR. May I also comment quickly on the ADS-B Out technology again and the handheld? We firmly believe that you cannot, should not use any kind of portable technology for ADS-B Out. For ADS-B In, I agree. But for Out, as I was saying earlier, you land at an airport in a small aircraft with a 757 landing next to you, he is going to be making decisions, and air traffic control is making decisions of safety of life for him and for his people based on what you are saying coming from your aircraft, and I think you do not want that to be from something you put in your pocket and walk away from the aircraft with. It is just not that kind of technology. It has to be installed, verified, and proven.

Mr. LUETKEMEYER. Very good. Thank you.

Mr. Button, Professor Button, you talked about some of the stuff that went on in Europe with regards to delays. What was the outcome of the continue to delay, delay, delay? Were there negatives? I mean, people get hurt, costs go down, that is a positive. What did you see from those constant delays?

Mr. BUTTON. Well, as far as I know, there are no detailed studies of this. There are no studies of this. It is very difficult to pick up because of the—

Mr. LUETKEMEYER. If something does not happen.

Mr. BUTTON. It does not happen—it's counterfactual if you like what is going on.

Mr. LUETKEMEYER. Right.

Mr. BUTTON. I think it is rather indicative to have a bigger problem in Europe. The European initiative of the Single European Sky of which ADS is a component is really to integrate—it depends how you do your numbers—37 different systems. You have got one system with the FAA here. So the problems are different. General aviation is hardly mentioned in the discussions quite bluntly.

Mr. LUETKEMEYER. Okay.

Mr. BUTTON. Military aviation is because we share disparate military airspace, but general aviation is not a major consideration.

Mr. LUETKEMEYER. Thank you. My time is up.

Thank you, Mr. Chairman.

Chairman GRAVES. Quick question for Ms. Derks.

If we do not start doing some installation pretty quickly, we are going to run into a real backlog problem. Would you agree? If you just do the numbers?

Ms. DERKS. Most definitely. If you do the math, when we can safely do 100 installs today, today's date, but every day that is delayed and every day that there might not be incentives such as a government-backed loan program, those daily installs will increase. And you do the math. With the approximately 700 U.S.-based repair stations that are capable of doing ADS-B Out installs, you can quickly surmise that we are going to have a huge backlog.

Chairman GRAVES. My final question for each one of you, real quick, if you could give the FAA one piece of advice on moving forward with this, now is your opportunity. What would it be?

Mr. Button, I will start with you.

Mr. BUTTON. You are looking at me. Get moving with the cash.

Chairman GRAVES. Mr. Hepp?

Mr. HEPP. I think if they worked a little harder to educate the general aviation public as to what the benefits and the timeline and reinforce that they are either going to slip the timeline or they are going to hold on the timeline, and then to make it very, very clear to operators at each level, whether it be a flight school, an individual operator, or a business that owns an aircraft, a charter operation, each type of business, to let them make informed decisions on when they are going to equip their fleet, what makes the most sense for them to equip their fleet to meet the requirements of the 2020 mandate.

Chairman GRAVES. Mr. Taylor?

Mr. TAYLOR. I would say hold fast to the mandate, hold fast to the rules, and provide leadership for your field operations so there is consistent application of regulation across all installs.

Chairman GRAVES. Ms. Derks?

Ms. DERKS. And I am going to expand on that. I would ask them to better communicate—headquarters to the aircraft certification offices to the flight standards, district offices, to the rotorcraft, the airport or airplane directorate, and the small airplane di-

rectorate, communication so that they are uniform in their regulations and their certifications and in their installation approvals as well. And to please sign the loan guarantee for the finance incentive program.

Chairman GRAVES. Well, I want to thank you all for participating today, and your testimony is going to help us better understand both the benefits that the FAA's NextGen initiative is going to provide, as well as the challenges to the GA community, what it is going to face in complying with that 2020 mandate. And it is clear that widespread industry adoption is going to be vital in this whole process. But in order for it to occur, the GA community has to have a way of equipping.

It has been an honor for me and the other Committee members to hear the FAA administrator and to hear you all, the industry leaders, and I appreciate you coming in. Some of you from a long way.

But I would ask unanimous consent that members have five legislative days to submit statements and supporting materials for the record.

Without objection, that is so ordered.

And with that, the hearing is adjourned. Thanks.

[Whereupon, at 2:45 p.m., the Committee was adjourned.]

A P P E N D I X

STATEMENT OF MICHAEL P. HUERTA, ADMINISTRATOR, FEDERAL AVIATION ADMINISTRATION, BEFORE THE COMMITTEE ON SMALL BUSINESS, FAA'S 2020 NEXTGEN MANDATE: BENEFITS AND CHALLENGES FOR GENERAL AVIATION, JUNE 11, 2014.

Chairman Graves, Ranking Member Velazquez, Members of the Committee: Thank you for the opportunity to speak to you today about the Next Generation Air Transportation System (NextGen), the 2020 mandate, and the benefits and challenges of ADS-B equipage for general aviation.

Through NextGen, the FAA is changing the way the National Airspace System (NAS) operates to achieve greater efficiency and predictability in air travel. NextGen will improve safety and support environmental initiatives such as reducing congestion, noise, emissions and fuel consumption through increased efficiency. NextGen will allow the NAS to expand to meet future demand and support the economic viability of our country's aviation system. Through NextGen, the FAA is moving from ground-based surveillance and navigation to more dynamic and accurate airborne-based systems and procedures in order to enhance capacity, reduce delay, and improve environmental performance.

Automatic Dependent Surveillance-Broadcast (ADS-B) is a key component of NextGen, which will move air traffic control (ATC) from a radar-based system to a more precise satellite-derived aircraft location system. ADS-B equipment combines an aircraft's positioning source, aircraft avionics, and a ground infrastructure to create an accurate surveillance interface between aircraft and ATC. The baseline installation of ADS-B ground station is now complete, so operators who equip now will see benefits now—there is no need to wait until 2020.

ADS-B has many benefits for users of the NAS, including the general aviation community. ADS-B provides air traffic controllers with more accurate information to help keep aircraft safely separated in the sky and on runways. With ADS-B, controllers get an update of aircraft position almost continuously, compared to every five seconds or longer with radar. This improves the precision of our tracking, leads to enhanced safety and greater efficiency, and ultimately results in a smoother flow of air traffic.

Since ADS-B ground stations are easier to install and offer a greater distance of coverage than radar towers. We have also been able to expand access through ADS-B. We now have ADS-B coverage in remote areas where radar coverage was limited due to constraints on the surface or over bodies of water, such as in the Gulf of Mexico, mountainous regions in Colorado, and low altitude airspace in Alaska. Operators in those areas are seeing benefits, including increased flight hours by virtue of being able to operate in periods of low visibility.

The improved accuracy, integrity and reliability of satellite signals over radar means it will be possible to safely reduce the minimum separation distance between aircraft and increase capacity in the nation's skies. Increased equipage by the aviation community will allow the benefits of the ADS-B to be realized and benefit all users of the NAS.

Equipage and Benefits of ADS-B Technology

ADS-B consists of two different services: ADS-B Out and ADS-B In. ADS-B Out periodically broadcasts information about each aircraft operating within the NAS, such as identification, current position, altitude, and velocity, through an onboard transmitter. ADS-B Out provides air traffic controllers with real-time position information that is, in most cases, more accurate than the information available with current radar-based systems. With more accurate information, ATC will be able to position and separate aircraft with improved precision and timing.

All users operating in designated airspace must be equipped with ADS-B Out avionics by January 1, 2020. The rule does not preclude other navigation sources; it simply requires that aircraft flying in certain airspace be equipped with avionics that meet performance requirements. The designated airspace includes Class A, B, and C airspace, as well as Class E airspace areas at or above 10,000 feet mean sea level (MSL) over the 48 contiguous United States and the District of Columbia, excluding the airspace at and below 2,500 feet above the surface. This airspace is more complex, with relatively diverse users. The rule also requires that aircraft operating in the airspace within 30 nautical miles (NM) of the nation's busiest airports be equipped with ADS-B Out capabilities. This will enhance safety, efficiency, and performance around those airports.

If you never fly into ADS-B designated airspace, there is no requirement to equip your aircraft with this technology. For the most part, the ADS-B Out requirement covers the same airspace where transponders are required; just as some aircraft are not required to be equipped with transponders, not all aircraft will need to be equipped with ADS-B Out. Users who never fly into designated airspace will not be impacted by the new requirements at all. In those cases, equipping with ADS-B technology is optional, but the benefits of ADS-B technology are available to any user who equips their aircraft.

ADS-B In technology allows pilots, including general aviation pilots, to see what air traffic controllers see: displays showing the location of aircraft in the sky around them. This creates an environment of shared situational awareness that allows for greater safety and efficiency. ADS-B In displays in the cockpit also pinpoint hazardous weather and terrain, and give pilots important flight information, such as temporary flight restrictions. Operators who have equipped with ADS-B In technology are already seeing these benefits in the cockpit.

Flight Information Service-Broadcast (FIS-B) and Traffic Information Service-Broadcast (TIS-B) are free services that are automatically transmitted to aircraft equipped to receive ADS-B In.

FIS-B provides a broad range of textual/graphical weather products and other flight information to users, including the general aviation community; it includes the following:

- Aviation Routine Weather Reports (METARs)
- Non-Routine Aviation Weather Reports (SPECIs)
- Terminal Area Forecasts (TAFs) and their amendments
- NEXRAD (regional and CONUS) precipitation maps
- Notice to Airmen (NOTAM) Distant and Flight Data Center
- Airmen's Meteorological Conditions (AIRMET)
- Significant Meteorological Conditions (SIGMET) and Convective SIGMET
- Status of Special Use Airspace (SUA)
- Temporary Flight Restrictions (TFRs)
- Winds and Temperatures Aloft
- Pilot Reports (PIREPS)

TIS-B is an advisory service that increases pilots' situational awareness by providing traffic information on all transponder-based aircraft within the vicinity of the ADS-B In equipped aircraft receiving the data. The costs of these broadcast services are absorbed by the FAA, so NAS users do not pay any subscription or usage fees for traffic, weather, or aeronautical information services.

Nearly seventy-five percent (75%) of weather-related general aviation accidents are fatal. Free traffic and weather information automatically transmitted to the cockpit is something the general aviation community benefits from. General aviation pilots with proper equipage are already taking advantage of these nationwide services.

When displayed in the cockpit, this information also improves the pilot's situational awareness in aircraft not equipped with a traffic alert and collision avoidance system (TCAS/airborne collision avoidance system (ACAS). Equipage for ADS-B In is not required under FAA regulations, but users who are equipping with both ADS-B Out and In are seeing the wider range of functionality afforded by ADS-B than those only equipping with ADS-B Out.

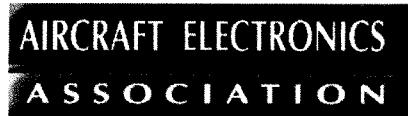
Challenges and Solutions Moving Forward

We are confident that users of the NAS, including the general aviation community, will see the advantages to ADS-B as they continue to equip and begin using the technology it offers. But, we also realize that increased technology generally requires increased investment for the government, private industry, which includes both large and small businesses, and individual aircraft owners. The FAA has made a significant investment in infrastructure to enable the technology being delivered through NextGen, including ADS-B. We are now calling on users of the NAS to equip their aircraft in a way that allows us to maximize the benefits of NextGen in designated airspace.

We are doing everything we can to ameliorate the burden on operators and facilitate low-cost alternatives for the general aviation community. Users already have a wide range of options to meet the 2020 mandate, if it will impact them. A variety of manufacturers have rule-compliant technology in various different price ranges on the market today. We commend the industry for what they are doing to facilitate equipage, and we look forward to continuing to work with stakeholders in this important endeavor. As required by Section 221 of the FAA Modernization and Reform Act of 2012 (P.L. 112–95), FAA is evaluating financing options and considering loan guarantee programs, but we also encourage users to take advantage of the financing options already available on the private market and through their respective associations.

The FAA believes that ADS-B technology is a key component in achieving many of the goals set forth in the NextGen Implementation Plan. The ADS-B Out equipage requirement is a major step toward establishing an air traffic system that accommodates future requirements and responds to shifts in demand from users by leveraging enhanced surveillance capabilities to increase capacity and efficiency of airspace use. ADS-B technology not only assists in the transition to a system with less dependence on ground infrastructure and facilities, but also creates capabilities for precision and accuracy, which in turn will make the system more operationally and environmentally efficient.

Mr. Chairman, this concludes my statement. I would be happy to take questions at this time.



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PAULA R. DERKS
PRESIDENT, AIRCRAFT ELECTRONICS ASSOCIATION

TESTIMONY – June 11, 2014

Chairman Graves, Ranking Member Velázquez, and members of the U.S. House Committee on Small Business:

Thank you for the opportunity to appear before you today on the benefits and challenges of the Federal Aviation Administration’s 2020 NextGen mandate on the general aviation industry.

My name is Paula Derks, and I am president of the Aircraft Electronics Association. We are an international organization representing nearly 1,300 companies of which nearly 80 percent are small businesses. Included in our membership are nearly 200 avionics manufacturers who are producing systems to meet ADS-B Out requirements.

Our largest category of membership is the 900-plus government-certified repair stations with approximately 700 in the United States certified by the FAA, and an additional 200 repair stations in more than 40 countries around the world.

My comments today will focus on three primary areas: 1) the ability of industry to meet the mandate; 2) the challenges my members face when certifying the new equipment and receiving field approval on the installation; and 3) the refocused effort needed from the FAA leadership to expedite implementation of this safety-enhancing technology and sign off on the Congressionally-authorized finance incentives for the aircraft operator.

It is important to note that all three of these areas are related to an overall lack of leadership within various divisions in the Federal Aviation Administration.

Today, the certified repair station industry has the capacity to perform ADS-B installations at a rate necessary for nearly 160,000 general aviation aircraft to comply with the ADS-B Out mandate by Jan. 1, 2020. Demand is expected to increase as the deadline nears, and AEA members indicate they will begin expanding their installation capacity in order to keep up with new demand.

However, general aviation aircraft owners are “on the clock” as ADS-B installation capacity today far exceeds aircraft owner demand. This inverse relationship will not last unless the industry immediately begins to see 100 or more installs completed per day – a 25-fold increase over the current installation rate.

Our industry has received mixed signals from the FAA in regards to the ADS-B mandate. This leads to confusion, rumors, and mistrust of the very agency charged with implementing the Next Generation Air Transportation System, which will exacerbate the backlog as early as 2016 and beyond.

As you might imagine when it comes to being forced by a government mandate to spend hard-earned, personal cash to upgrade when benefits to the consumer have not yet been fully realized, it is not an easy sell. But, in our recognition of the enhancement of safety and efficiencies that NextGen will bring our nation, we have worked our best to educate the general aviation industry and move forward on implementation.

Yet, throughout our efforts, and those of our sister trade associations, and industry itself, the FAA seems to be dragging its feet.

From day one, Administrator Huerta's office has been a vocal proponent of the NextGen implementation, and has said the right things -- they have promised a reasonable transition, offered cost effective solutions, and worked to make sure the ground infrastructure was in place..... only to have their efforts derailed by the back office who's individual guidance, excessive micro-management and personal opinions compete with the overall objectives.

When you consider the nearly 160,000 aircraft still needing ADS-B equipage as of today, this is not a strategy for meeting the deadline and providing safe, efficient, and cost effective installations.

Our members--both the manufacturers and the repair stations--are sharing with us that there is general mistrust of the FAA, and their decision-making....or lack thereof.

Rumors are swirling that the mandate will be extended, or new and cheaper technology will miraculously be introduced at the very last moment. All these rumors and mis-truths create a very confused consumer.

Ironically, the very agency who is charged with overseeing the safety and efficiency of our nation's skies, is the same agency causing this turmoil.

Several of our repair station members tell us that their customers--the a/c operators have decided to wait until the last minute to equip because they assume the FAA will operate as usual--with delays---and will have to extend the deadline to equip. Again, industry has no faith in the leadership of the FAA to actually stick to the mandate of Jan 1, 2020.

The FAA has a history of not implementing rules on time. We cannot remember one avionics mandate in the last five decades that was implemented without an extension. These extensions have created a public perception that the FAA will, once again, allow another exception, creating the potential for a serious backlog as the 2020 deadline nears.

However, for those operators who have decided to equip now, the FAA is still a constraint. For example, we have a member in Las Vegas who supports a helicopter fleet operator wanting to equip a fleet of 90 helicopters. He currently has the correct ADS-B equipment installed. But because his aircraft has not been FAA “approved” for ADS-B operations, he can’t turn the system on.

For clarity, the navigation-transponder system he is installing into this fleet has already been approved by the FAA in thousands of airplanes, but because this is a fleet of helicopters, the approvals don’t count.

So the penalty for this operator – who is willingly following the law by equipping for ADS-B operations – is experiencing six months of costly administrative burden and an additional cost of approximately \$30,000 in certification fees.

The constraint: they had to coordinate the approval with a two-person team at FAA Headquarters in Washington who manage all ADS-B installations. Then, they had to get consensus from a single engineer at the FAA Rotorcraft Directorate in Fort Worth, Texas, even though there were no modifications to the aircraft.

Despite the fact that the FAA employs thousands of very talented engineers, all 160,000-plus general aviation aircraft needing an upgrade must pass through a couple of project managers in Washington.

Since the ADS-B Out mandate first became a rule in 2010, the AEA has been working with our constituents to educate them, inform them of progress, and how to best comply with the mandate. The AEA has promoted the recently announced financing program, the NextGen GA Fund. The NextGen GA Fund was designed to take advantage of the public-private partnership funding authorized by Congress in the 2012 FAA Reauthorization Bill, to create an incentive for operators of aircraft to take advantage of low-interest, government-backed loans to buy the necessary equipment in order to comply with the mandate. While there may be an ongoing debate regarding the fund, the lack of FAA’s willingness to embrace the fund is a testimony to the cancer that has wreaked havoc on the Agency for the past decade. The Agency has a culture of “can’t” rather than a culture of “can do”. The Agency’s employees are so absorbed with finding why something cannot be done they have lost the aviator’s vision of how to accomplish the task in spite of the barriers and challenges. The only cure for this type of corporate disease is leadership! It will take strong leadership to change the corporate culture from one that is satisfied with can’t and move it towards one of defining how to move beyond the barriers.

Yet, despite our efforts, and those of our sister trade associations, and industry itself, to promote early equipage, the FAA is dragging its feet on the incentive program by not signing the loan guarantee certificate. Until they issue the loan guarantee certificates, nothing moves on this program.

Keep in mind; the monies raised for financing these loans are from private investors. Our industry is not asking for government money; we are only asking for the FAA to immediately issue the loan guarantee certificates – as they were directed by Congress to do so.

With these incentives in place, the industry has indicated it still has the capacity to manage the groundswell of installations, assuming aircraft owners have renewed faith in the FAA, that the deadline will not be extended, and certifications will be streamlined. A recent survey of AEA members indicated that in order to meet this new demand, more than 75 percent of the 700 FAA-certified U.S. repair stations will expand and hire more employees – this is job creation!

A direct contributor of nearly \$40 billion to the U.S. gross domestic product --according to the FAA Air Traffic Organization-- general aviation is a significant contributor to the overall health of the economy.

If we are able to tackle the challenges I have outlined, general aviation will continue to have a positive economic impact, create jobs, and sustain our service to the law enforcement, agricultural and medical communities that rely upon us.

In closing, we ask the Administrator to begin the long leadership recovery to restore the culture of can do. It is the Agency's historical culture that created the greatest aviation industry in the world. Without this leadership the industry will continue to suffer and this mandate as well as future mandates are destined to fail.

In addition, the challenges we ask Congress to address include:

- 1) An effort by the FAA to incentivize aircraft owners by immediately signing the loan guarantee certificate for the NextGen GA Fund,
 - 2) Streamlining the certification process to produce efficiencies in ADS-B installations, and
 - 3) Restore aircraft owners' confidence in the FAA that this deadline won't be extended and their money is well spent.

Thank you for the opportunity to testify on behalf of the general aviation industry.

Testimony of Tim Taylor
President and CEO, FreeFlight Systems, Inc.
On Behalf of the General Aviation Manufacturers Association
Committee on Small Business
U.S. House of Representatives

FAA's 2020 NextGen Mandate: Benefits and Challenges for General Aviation

June 11, 2014

Introduction

Chairman Graves, Ranking Member Velázquez, and other distinguished members of the Committee, my name is Tim Taylor, and I am president and chief executive officer of FreeFlight Systems. Today, I have the privilege of also representing the General Aviation Manufacturers Association (GAMA) and am honored to provide testimony to the Committee on their behalf.

I appreciate the opportunity to discuss today the benefits of the nation's transition to the Next Generation Air Transportation System (NextGen) for general aviation (GA) and to highlight the importance and ability of industry to meet the Federal Aviation Administration's (FAA) 2020 automatic dependent surveillance-broadcast (ADS-B) Out mandate. As the leader of a small aviation manufacturing business, I thank the Committee for holding this hearing and look forward to describing how NextGen avionics—specifically ADS-B equipage—is readily available, affordable, and easy to install.

At a basic level, NextGen represents the shift from the existing radar-based air traffic control (ATC) system to a more automated aircraft-centered, satellite-based system. FreeFlight Systems designs, manufactures, and supports electronics systems that enable and support the NextGen air traffic management transformation. We are experts in the essential technologies at the heart of NextGen and we apply these technologies to platform equipage across a broad spectrum of air and ground vehicles, and to infrastructure development and services.

Since NextGen equipage presents unique challenges from a retrofit perspective, we have focused on developing a series of core elements that can be easily installed into the diverse, and often quite old, aircraft fleet. We certified our first ADS-B Out radio in 2011, obtained our first installation approvals in 2012, and have delivered around 1,000 ADS-B radios and around 3,000 ADS-B position sources since then.

As a small business, we made the research and development investments—more than \$3 million—upfront to allow aviation operators the ability to meet the FAA's 2020 ADS-B mandate. In short, we have already accomplished the “heavy lifting” required to make our solutions readily available, affordable, and easy to install. We

are seeing rapid acceleration today in the adoption and installation of ADS-B systems in both airborne and airport surface vehicle applications.

FreeFlight Systems does all this as a small business located in Texas that currently employs 53 people. We either perform or source out manufacturing in the United States, predominantly in Texas, but we are also part of the global aviation industry, exporting around 40% of our products. I should note that our exports are enabled in part by the Export-Import Bank of the United States (Ex-Im). Ex-Im guarantees credit that we grant to offshore customers, allowing us to access cash from our commercial banking partners at the point of sale. Like Free Flight, many other small manufacturers across the country depend on Ex-Im and we hope Congress will move the reauthorize the Bank before the end of September when the current authorization expires.

Why NextGen Matters to GA

While today's hearing focuses on ADS-B, I would like to note that ADS-B is only one of a number of core capabilities that make up the broader NextGen program, including Data Communications (DataComm), Performance-Based Navigation (PBN) and System-Wide Information Management (SWIM), to name a few.

The potential benefits of NextGen to the aviation community are significant. The transformation enables improved safety, increases the capacity of the airspace system, and reduces the cost and complexity of ATC. For GA operators, many of these benefits are immediately available upon appropriate equipage, but realizing the full potential of the broader NextGen programs across the National Airspace System will require significant additional work by the FAA.

Before ADS-B, information on aircraft position was gathered by radar systems only and then used by air traffic controllers to separate aircraft. The current ATC system does this by drawing a bubble around each aircraft that represents its possible positions. As long as the bubbles do not touch, separation is assured. Using radar, these bubbles can be tens of miles across, and they are updated every 12 seconds or so. In contrast, an aircraft that is equipped with a rule-compliant ADS-B Out system is broadcasting key parameters once per second, along with a parameter that precisely describes the size of the bubble, for that aircraft. These ADS-B bubbles can be tens of feet across instead of miles.

This high-quality, high-update rate broadcast allows ATC to better manage airspace and air traffic management, becoming more automated and less dependent on human decision-making. The transmitted information is also available to other aircraft that are equipped with an ADS-B In system, so pilots get that same high-quality traffic picture right in their cockpits. The FAA also provides an additional uplink to ADS-B users of Flight Information Services, which includes local and national graphical weather pictures, as well as important information about meteorological and other conditions across the system.

This high-precision traffic picture has other benefits. Fleet operators, such as flight schools, can track their aircraft and ensure that they are operating in accordance with plan and procedure. Additionally, if an aircraft should experience difficulties, ATC can provide quick and precise direction to the aircraft.

The more airplanes that equip, the more dramatic the improvements in capacity and safety become. The full potential can be realized when all aircraft in controlled airspace are equipped, which the FAA has mandated by January 1, 2020. The rule and mandate were established early in 2010, giving aircraft operators 10 years to equip. Equipment manufacturers have had longer. The system architecture was finalized in 2007 and the rules and requirements have not changed substantially since then. The ground infrastructure of the system is largely deployed and is operational across the country. There are no regulatory or infrastructure barriers to full equipage to meet the mandate. This long-term stability is essential if small businesses are to participate in the NextGen transformation.

ADS-B Compliant Equipment is Readily Available

In addition to providing a consistent set of rules and requirements, as well as providing a 10-year window to equip aircraft, the FAA has taken other positive steps to ensure that rule-compliant equipment is available and ready for the marketplace.

In several cases, the FAA formed “in-kind” partnerships with early adopters, such as Gulf of Mexico helicopter operators, and collaborated with them to work on installation and certification efforts, solve problems, and capture lessons learned. FreeFlight Systems was chosen by several of these early adopters to provide the avionics equipment for these activities and, in each case, it was a rich learning environment that allowed us to improve our product. Many of these aircraft have now been operating for several years, providing additional opportunities to test and develop the system. The products that FreeFlight Systems offers today are already third-generation, as we have been able to incorporate lessons from these early activities.

Many other manufacturers have participated in these proving exercises across all strata of the National Airspace System. Mature, rule-compliant equipment is available today from multiple vendors for light GA, rotorcraft, business aviation, and airline transport aircraft. More products are entering the market this year. They are being offered both by the traditional major avionics suppliers and by some specialist small businesses, such as FreeFlight Systems. In fact, some of the major brand products are private-label versions of these small business offerings.

In 2013, FreeFlight Systems was pleased to be awarded a direct FAA contract in full and open competition to replace early version ADS-B units with rule-compliant systems for several hundred aircraft in Alaska. These aircraft were part of the original Capstone

ADS-B development program.¹ This contract gave FreeFlight the opportunity to install our ADS-B equipment in a variety of aircraft types typical of the larger GA fleet. This experience gave us first-hand knowledge of installation complexity, time, and cost.

FreeFlight Systems today offers rule-compliant ADS-B radios suitable for light GA² and rotorcraft in a variety of configurations, with optional internal global positioning system (GPS) receivers. We have installation approval for several hundred aircraft types (fixed and rotary wing), and we are constantly adding to this list. Additionally, we provide a range of rule-compliant, low-cost, stand-alone position sources that are compatible with other suppliers' ADS-B radio offerings for all aircraft segments.

ADS-B Compliant Equipment is Affordable and Easy to Install

For the light end of GA, ADS-B equipment can be relatively inexpensive and easy to install. FreeFlight Systems offers complete solutions today at a list price that is less than \$4,000, and we are seeing installation times that are typically in the 20 to 40 hour range (with—\$2,000 to \$4,000 for labor), for a total cost of \$6,000 to \$8,000. This estimate includes rule compliant ADS-B Out, as well as ADS-B In. In a newer aircraft, ADS-B In can utilize an existing display to show the beneficial navigation/situational information. In an older aircraft that has not seen a new piece of avionics since the 1960s, ADS-B In can simply utilize an iPad. Costs can be lower for aircraft that already have some elements of the system. Using the same products, uncertified aircraft can be equipped for less than \$4,000. These prices appear to be acceptable to the light aircraft market.

For larger aircraft, the costs become more dependent on the type of transponder fitted. For most aircraft, there is an upgrade path for the transponder and a FreeFlight Systems position source that lists in the range of \$2,500 for light GA to \$11,000 for larger aircraft. FreeFlight Systems offers a complete package for aircraft that operate in 18,000 feet to 24,000 feet range for \$7,600. For heavier aircraft, the total cost is driven by the transponder manufacturer. Installation times for these systems are well within aircraft maintenance scheduled downtimes.

Why the ADS-B Out Mandate is Important

In the past few weeks, we have seen aircraft near-misses at major airports in the United States. Management of aircraft in crowded airspace is a complex, fast-moving, four-dimensional puzzle. The nation's air traffic controllers do an amazing job maintaining separation between aircraft. However, the tools they have at their disposal today have remained largely unchanged for decades, while capacity, aircraft performance, and aircraft mix are increas-

¹ FAA: "The Capstone Project was a joint industry and FAA research and development effort to improve aviation safety and efficiency in Alaska. Under Capstone, the FAA provided avionics equipment for aircraft and the supporting ground infrastructure. The Capstone Project operated from 1999 to 2006, and its success in Alaska laid the groundwork for the nationwide deployment of ADS-B." (<http://www.faa.gov/nextgen/implementation/programs/adsb/wsa/archival/>)

²Aircraft weighing less than 12,500 pounds.

ing dramatically. NextGen provides the capability to completely re-think and re-tool air traffic management.

For NextGen to be effective, however, there needs to be a change in infrastructure and a change in aircraft equipage. The FAA has implemented the infrastructure and has provided details and complete rules for equipage, but for the system to work to its full potential, every aircraft that enters controlled airspace needs to meet minimum equipage standards or it will disproportionately impact operations. Think of all the ADS-B aircraft, safely inside their small bubbles, flowing smoothly in and around an airport. One un-equipped or poorly-equipped aircraft enters the picture with a bubble that is tends of miles across, pushing everybody else out of position and disrupting the system until it is safely out of the way. To avoid that scenario, everybody has to equip, and to equip properly. A mandate is the only way to ensure that happens, and to ensure that everybody who invested in the new system—industry, users, and government—gets the return they deserve on the investments they have made.

The mandate also provides the framework for implementation of the system and equipage. In the light GA segment alone, there are almost 200,000 aircraft in the United States today. Not all of those are flying, of course, and not all of them need to enter controlled airspace, but between 120,000 and 140,000 aircraft need to equip. Currently, only some 4,000 of those aircraft are equipped.

With approximately 2,000 days between now and January 1, 2020, we need to equip 60 to 70 aircraft per day—including weekends and holidays—or 85 to 100 aircraft per work day. As a nation, we comfortably have the capacity to equip at this rate, but only if there is reasonable linearity.

Incentivizing Equipage

The government has provided the environment to make equipage by January 1, 2020 possible. Industry has stepped up to provide the equipment at the right price point and has the capacity to install it. Before considering other actions that could be taken to further incentivize equipage, it is worth considering actions and messages that could damage the gains already made—snatching defeat from the jaws of victory.

First and foremost, the mandate must remain in effect and the aviation community has to believe it will hold. If the community thinks there is any chance of delay, equipage will stop.

Second, the rules that have been put in place need to stay in place—and the community has to believe that also. There are some well-intentioned initiatives like “Low Power Surveillance Equipment” (LPSE) that are designed to provide equipage options for aircraft like gliders with special needs. The general population sees this as an opening of the door to lower standards—and equipage will slow down while they wait to see how that plays out. FAA should consider such options where appropriate, but FAA also needs to clearly articulate that this is a limited exception and the fundamental requirements will stay in place.

Additionally, the idea that has been suggested by some that equipage is going to get cheaper as we get closer to the deadline is misleading and a major reason for delay. The prices we are offering for equipage now are artificially low. FreeFlight Systems is making high-volume purchases and we have reduced our margin expectations to get products in the market at an acceptable price point. As volumes start to go up, we will not be able to hold these low prices. The same is true for installation. Forward-thinking installers, just like forward-thinking equipment suppliers, are offering low prices to get equipage started.

In our view, the best incentives from government and industry are already in place: infrastructure, a firm schedule, stable requirements, and aggressive pricing. However, there is always more that could be considered.

Low interest, government-backed financing has been discussed in the marketplace, and authorized by Congress, and is popular among FreeFlight customers. FreeFlight Systems announced a partnership with the Nexa Capital NextGen GA equipage fund and aircraft owners have responded favorably. I believe more aircraft owners would equip as the Nexa program becomes available, or other programs with a similar format develop. Unfortunately, the implementation of these financing options have faced delays and I urge Congress to examine ways to expeditiously move them forward.

Additionally, inconsistency in the application of certification standards across different FAA branches and regions is a barrier to equipage and innovation in all areas of aircraft modification. Many NextGen programs are being given priority in modification approvals, but strong leadership, training, and consistent application of standards will reduce delays and increase the number of installers willing to aggressively price and perform ADS-B installs.

Conclusion

The timely introduction of NextGen technologies is vital to supporting the safe and efficient operation of our nation's airspace system, and to maintaining U.S. global leadership in aviation.

The nature of the transformation is such that there are multiple opportunities for small businesses to participate, and a stable government position on equipage standards and timing for equipage are essential elements to the success of the transformation itself and to small business involvement.

Government and industry, both large and small, have worked in harmony to ensure that equipment is available at the right price, that there is plenty of time to plan and execute installation, and that the infrastructure is in place to provide both immediate and potential longer-term benefits to those who equip today.

While some initiatives could perhaps speed up the ongoing equipage of the fleet, the absolute key to meeting the equipage deadline is to hold fast to the current rules and schedules. Any wavering or mixed signals hurt NextGen progress, safety, and small businesses that are playing by the rules.

Thank you for the opportunity to testify this afternoon, and I look forward to answering any questions that you may have.

**Before the Committee on Small Business
United States House of Representatives**

**FAA's 2020 NextGen Mandate:
Benefits and Challenges for General Aviation**

**Statement of
Bob Hepp
Owner, Aviation Adventures**

Representing the Aircraft Owners and Pilots Association

June 11, 2014



Chairman Graves and Members of the Committee:

I am Bob Hepp, Owner of Aviation Adventures.

Aviation Adventures is a highly regarded flight school with locations in Manassas, Warrenton, Stafford, and Leesburg, Virginia. Our staff of 41 employees provides flight instruction at all levels from initial training through the Airline Transport Pilot certificate. We also provide rental aircraft to certificated pilots.

I started Aviation Adventures in 1989 with one aircraft and myself as the only instructor. Today we have 39 aircraft and are known as the premier flight school in Virginia and the leader in providing training in Technologically Advanced Aircraft.

I am also representing the Aircraft Owners and Pilots Association (AOPA) of which I have been a member since 1981. AOPA is a not-for-profit individual membership organization representing more than 350,000 members nationwide. AOPA's mission is to effectively represent the interests of its members as aircraft owners and pilots concerning the economy, safety, utility, and popularity of flight in general aviation (GA) aircraft.

My testimony today will cover the following key points:

1. The General Aviation community has long supported the move from ground-based to satellite-based navigation. However, at this time, the benefits associated with the FAA mandate are inadequate and unclear for general aviation users.
2. The FAA's mandate to equip for ADS-B (Automatic Dependent Surveillance - Broadcast) Out by 2020 is costly and will be prohibitive for most small flight schools, businesses utilizing aircraft, and recreational aviators.
3. Providing low-cost guaranteed loans for GA equipage and leveraging existing cockpit technologies, such as handheld devices, can help move NextGen modernization forward without imposing unmanageable burdens on small aviation businesses.

General Aviation

As pilots flying in the United States, we are fortunate to have access to the safest and most efficient air transportation system in the world. The aviation network of 5,200 public-use airports, complemented by the more than 13,000 privately owned landing facilities is a unique national resource. General aviation is a significant economic engine that contributes approximately \$150 billion to the annual gross domestic product and approximately 1.2 million jobs in communities nationwide. Each year, 170 million passengers fly using personal aviation, the equivalent of one of the nation's major airlines.

General aviation is of special importance to small businesses, and a significant amount of all general aviation flights are conducted for business and public services. Additionally, the Small Business Administration has estimated that approximately 94% of the firms that provide cargo and passenger air transportation serv-

ices are considered small businesses, as are 90% of businesses involved in the development and manufacture of aircraft and parts.

In addition to these businesses, general aviation activity directly supports thousands of small businesses from flight schools to repair shops to line operations. Thousands more small businesses of every type use general aviation to transport personnel, move products, extend their geographical reach, meet clients, provide support services, and manage distant operations.

The ADS-B Mandate

Effective January 1, 2020, any aircraft operating in busier airspace where a Mode C transponder is required today, will also be required to carry an ADS-B Out transmitter. The rule does not mandate ADS-B In equipage and does not impact the current transponder requirement—menaing aircraft will continue to be required to carry their transponders in addition to this requirement for ADS-B Out equipage after 2020.

Unlike most rulemaking activities which are safety based, the basis of the mandate is to support the FAA's Next Generation Air Transportation System (NextGen). The FAA has indicated that the mandate will not greatly increase or decrease safety, but is necessary to move forward with NextGen.

Lack of Benefits for General Aviation Equipage

For more than 20 years AOPA has supported the transition from ground-based infrastructure to satellite-based systems. AOPA also supports ADS-B provided it is affordable and delivers clear, tangible benefits to users. The Association is hopeful that changing technology and modifications to the implementation approach will make ADS-B more valuable to the GA community. However, at this time, it is difficult to identify adequate benefits in the current ADS-B implementation strategy.

For most general aviation pilots, there are no direct benefits of the ADS-B Out mandate. Rather, complying will simply allow pilots to continue using the national airspace system as they do today.

Mandate Is Costly And Could Be Prohibitive to Small Businesses

Aviation Adventures owns and operates 39 aircraft for flight training and rental. The ADS-B mandate will require significant changes to these aircraft, including the removal of some equipment and possibly the redesign of the control panel to accommodate the new equipment.

The actual avionics required to meet the mandate would cost approximately \$5,000 per aircraft. Additional costs associated with

changes to the control panel and installation of the new equipment would add approximately \$3,000 to \$4,000 per aircraft. I estimate that the total cost to equip my fleet will be \$312,000 for minimal compliance—a major investment for a small business and one many small aviation businesses will be unable to make.

I recently participated in a Flight School Conference with 88 Flight Schools in attendance. The topic of investing in avionics upgrades was part of the discussion. When the question was asked how many flight schools were profitable and could afford to invest in new avionics, representatives of only three schools indicated they were ready to make such an investment.

Unlike investing in adding aircraft or facilities, the money spent on ADS-B Out equipment will not bring a return because it will not increase our customer base, allow us to serve more clients, provide new capabilities, or otherwise help grow the business.

For that reason alone, it is not a sound business decision to equip early since there will be no return on investment.

Continuing uncertainties about exactly what the FAA will ultimately require to fulfill the mandate further reduces the incentive to equip the aircraft in advance of the mandate. Business owners are reluctant to make a large investment in new equipment when that equipment may ultimately not meet FAA requirements.

The tendency of technology prices tend to drop significantly over time also serves as a disincentive to equip early. Anyone who purchased a large flat screen television a few years back is familiar with this phenomenon. A television that I purchased a few years ago when the technology was relatively new cost \$3,000. Today, the same television can be purchased new for just \$800. Similar trends apply in avionics. We have already seen a decrease in prices for ADS-B equipment since the mandate was finalized in 2010. It is in the interest of business owners to wait for further price drops before investing in new equipment.

Loans and Existing Technology Can Help More NextGen Forward

Because of the high cost and low return on equipping for the 2020 mandate, general aviation operators need assistance to equip. The establishment of a fund to provide low-cost, federally guaranteed loans to equip GA aircraft could provide the financing needed to help the GA community meet the mandate.

At the same time, maximizing the utility of existing cockpit technology can help move NextGen modernization forward without imposing unmanageable hardships on general aviation operators.

Handheld devices can provide ADS-B In information, significantly enhancing safety at nominal cost. Many aircraft operators are already using these handheld devices in the cockpit, and the same devices could be used to provide ADS-B Out.

By focusing on providing added capabilities to GA operators using existing cockpit equipment, the FAA could increase oper-

ational efficiency. Providing precision approaches to airports that don't already have them would allow pilots to make all-weather use of airports that do not currently have that capability. Offering surveillance outside of the existing radar footprint would increase safety for operators flying at low altitudes and outside of large airports. Additional capabilities could include more efficient point-to-point navigation and better routing through congested airspace. Together, these capabilities can boost general aviation use and the resulting economic impact by saving fuel and time, increasing safety, and lowering the cost of flying.

Conclusion

In conclusion, I believe the current ADS-B Out mandate fails to provide the needed benefits and support for general aviation operators and businesses to equip. At the same time, there are a number of steps the FAA can take to move NextGen modernization forward while promoting safety, encouraging general aviation activity, and reducing the burdens on small general aviation businesses.

By creating a fund to provide low-cost guaranteed loans and leveraging existing equipment to provide benefits like improved point-to-point navigation, extended surveillance, and precision approaches at airports not currently served, the FAA can take advantage of the equipment already in cockpits, keep NextGen moving forward, and help GA businesses thrive.

On behalf of the 41 employees of Aviation Adventures and the more than 350,000 members of AOPA, we appreciate your leadership in addressing the concerns of the general aviation industry so that it can continue to help small businesses nationwide grow and thrive.

Thank you for the opportunity to appear before this Committee.

**Federal Aviation Administration's 2020 NextGen Mandate: Benefits
and Challenges for General Aviation**

Kenneth J. Button PhD, AcSS, FCILT, FCIHT

University Professor

School of Public Policy

George Mason University

Evidence to the U.S. House of Representative's Committee on Small
Business

Room 2360 of the Rayburn House Office Building

June 11, 2014

BACKGROUND

There have been considerable technical advances in air traffic navigation over the past 30 years leading to potentially safer and, from a commercial perspective, more efficient air travel network. The changes allow, for example, reduced separation between aircraft that permit greater flexibility in routing. In particular, a move from ground-based radar technology to satellite systems offers many long-term advantages. There are a multiplicity of air navigation providers around the world currently developing, and at various stages of implementing, a wide-range of new technologies aimed at developing a common platform for satellite based navigation and control systems. The challenges nationally and internationally to bringing about a shift to satellite systems are both technological and economic in nature.

As with any change, reaching an accord on common standards and transitioning this into a working system is not a simple technical matter. In terms of costs, there is the need for new equipment, an inevitable transitional wastage from duplication as the old and new systems overlap in time, and considerable stranded costs as technically sound radar based systems are made economically redundant. There are still concerns about the technical reliability of the systems being introduced, and, for example, their capacity to handle large volumes of information, particularly in the transition phase, and, as far as general aviation is concerned, over the anonymity of the information obtained. Added to this is the matter of how the new system is to be financed. There have been problems in the past in financing and administering the ground based elements of the system. The 2012 FAA Air Transportation Modernization and Safety Improvement Act, for example, was the first reauthorization of Federal Aviation Administration funding since 2007; the Administration had the uncertainty of 23 extensions in the interim.¹

¹This is a topic that is not dealt with here but has posed practical issues in the United States as well as elsewhere; e.g. see; OFFICE OF INSPECTOR GENERAL, *Audit Report: Federal Aviation*

The automatic dependent surveillance-broadcast (ADS-B) technology that forms one of the cornerstones for the new approach to air navigation, and which is to be a requirement for use of certain United States airspace by 2020, is a cooperative surveillance technology for tracking aircraft.² The Federal Aviation Administration rule requiring the uptake of this technology was announced in 2011. The system relies on aircraft or airport vehicles broadcasting their identity, position and other information derived from on-board systems. The information is more accurate than that available to primary systems, such as radar surveillance.

The ADS-B Out signals transmitted from an aircraft can be captured for surveillance purposes on the ground but only on board other aircraft equipped for ADS-B In. The latter enables airborne traffic situational awareness, spacing, separation and self-separation applications; basically it provides a three dimensional halo around each plane. With ADS-B In an aircraft essentially determines its own position via satellite navigation and broadcasts this via a radio frequency with knowledge of what is going on about it. For a comprehensive ADS-B structure without primary surveillance by radar, all planes must be equipped with both ADS-B Out and In. This is a long-term objective, simple location is with some additional information is the short-term objective.

The issues addressed here focus on three interrelated areas:

- The pros and cons of ADS-B
- Payment for the system
- The phasing-in of ADS-B

THE PROS AND CONS OF ADS-B

The ADS-B concept is at the core of both the \$40 billion Next Generation Air Transportation System (NextGen) which was initiated in 2009 in the United States and of Single European Sky ATM Research (SESAR) in Europe that was initiated in 1999.

The European Single Sky initiative has a somewhat different objective to NextGen. The United States challenge is to replace a unified radar based system that has grown in a rather *ad hoc* way and thus in need of serious efficiency improvement to handle traffic growth. The Federal Aviation Administration, for example, has estimate that increasing congestion in the air transportation system of the United States, if unchanged, would cost the American economy \$22 billion annually in lost economic activity by 2022. In addition to addressing this, NextGen is specifically seen as reducing aviation fuel consumption and emissions. In contrast, the European challenge is to initially reduce the large number of air navigation service providers from nearly forty to a one; i.e. structurally to make it akin to the American system. Despite difference in motives, there is agreement between the United States and

Administration's Contraction Practices are Insufficient to Effectively Manage its Systems Engineering 2020 Contracts Federal, Report Number: ZA-2012-082, 2012.

²Strictly the ADS-B system relies on two avionics components—a high-integrity GPS navigation source and a data link. The current transponder or RVSM maintenance requirements are not changed or affected by the ADS-B rule.

EUROCONTROL over broad approaches towards interoperable satellite based systems.

The issue of general aviation, while of considerable importance in the United States, has attracted little attention in Europe with its Single European Sky initiative quite simply because it is of a far smaller order of magnitude. For example, while there were 209,034 registered general aviation planes in the United States in 2012, there were 21,462 in Germany in 2013, 32,410 in France in 2011, 19,850 in the United Kingdom in 2013, and 3,657 in Switzerland in 2012.³

The United States will require the majority of aircraft operating within its airspace to be equipped with ADS-B Out by 1 January 2020; the specific categories of airspace involved are seen in TABLE 1. These are airspaces where a more basic transponder is already required.⁴ There is no requirement for aircraft to have ADS-B In capabilities by January 1, 2020.⁵ In terms of general aviation the requirement has been variously estimated to affect between 157,000 to 165,000 aircraft⁶.

TABLE 1

Airspace	Altitude
A	All aircraft equipped
B	All aircraft equipped
C	All aircraft equipped
E	Above 10,000ft MSL but not below 2,500 ft AGL

One of the major challenges of NextGen is to develop a system that caters for the requirements of a diverse range of air transport users, often with quite distinct characteristics and needs. At one level are large civil scheduled commercial airlines that in 2013 had 642 million passenger enplanements in the United States and carried 19,729 million lbs of cargo and mail. The scheduled passenger carriers currently operating with wafer thin financial margins and with a legacy of inability to even recover their operating costs, often see the burden of even the small cost per revenue passenger mile as difficult to justify at the operational level. At the longer-term, strategic level, however, the ability to increase the reliability and capacity of services across large networks is generally seen as a significant development. In contrast, the scheduled cargo/express carriers that tended to enjoy higher margins, have largely been more enthusiastic about the change with; for example, UPS, has adopted it because it is seen as a tool for improving fleet operations with it knowing exactly where planes are (and *de facto* where con-

³GENERAL AVIATION MANUFACTURERS ASSOCIATION, 2013 *General Aviation Statistical Databook & 2014 Industry Outlook*, Washington DC, 2014.

⁴They are also required at all altitudes within 30 miles of some airports and some other flights over water.

⁵The Federal Aviation Administration is publishing its final rule justified this; "Standards for ADS-B In air-to-air applications are still in their infancy ... it is premature to require operators to equip with ADS-B In at this time."

⁶General aviation includes businesses engaged in on-demand passenger or cargo charter flying; corporate flight departments; owner-flown aircraft; flight schools; companies offering aircraft fuel, storage, maintenance and parts; and aircraft sales, brokerage and rental firms.

signments are) when outside of radar surveillance and for managing their flights in real time.⁷ FedEx has supported it for similar reasons.

More generally, the recent events involving commercial scheduled passenger flights AF477 and MH370 has brought a heightened public awareness of the inadequacies of modern air navigation systems, or at least their deployment, and in the inability to locate flights all of the time. The costs of trying to locate a crashed plane are high both in economic and human terms; something that extends to general aviation. General aviation crashes are more common than for scheduled flights, which is not surprising because they represent about 96% of the United States air fleet, but involve fewer details and injuries per incident; e.g. there were 1,471 accidents in 2012 resulting in 432 fatalities.

While it is important to be wary of making comparisons, particularly when data is collected in different ways, this situation can be put in the context of commercial aviation being about 50 times safer and car travel 20 times safer than general aviation in terms of fatalities per hour traveled between 2002 and 2012. (The use of alternative matrices, such as accidents or serious injury, changes the picture slightly ADS-B should reduce the accident rates for general aviation and make research and rescue operations more effective and less costly. While most general aviation accidents occur at or near airfields, some, often weather related, are in more remote locations. The extent to which the types of flights involved would come under the 2020 ADS-B regulation is, however, unclear.⁸ A full ADS-B strategy may well produce far greater benefits for the marginal costs it would entail.

Even large planes get lost. The most tragic and best known cases are perhaps the Uruguayan Air Force Flight 571 that crashed in the Andes in 1972 because of bad navigation, and AF477 into the South Atlantic partly because of poor information on altitude, but there are regular instances of aircraft landing by mistake at the wrong airports in the United States; luckily accidents are rare.⁹ ADS-B Out, and ADS-B In more so, provides a mechanism for pilots and ground control to have greater awareness of aircraft locations. ADS-B In, for example, reduces the risk of runway incursions with cockpit and controller displays that show the location of aircraft and equipped ground vehicles on airport surfaces. In addition, ADS-B Out can provide local information regarding real-time weather conditions.

Putting a money value on these benefits, and others that are general aviation specific is difficult. There will be savings in fuel, weather information will be better, and provided automatically,

⁷The more efficient use of aircraft and the consequential lower fuel burn is also likely to have environmentally beneficial effects, see US GOVERNMENT ACCOUNTABILITY OFFICE, *Aviation and the Environment: NextGen and Research and Development Are Keys to Reducing Emissions and Their Impact on Health and Climate*, GAO-08-706T, 2008.

⁸There seems to be no single gathering of information of the search costs involved when a general aviation plane goes missing, a simple search of the Web, however, provides numerous examples.

⁹<http://www.iasa.com.au/folders/Safety—Issues/others/wrong-ways.html> provides a list of commercial aircraft landing at the wrong airport. There appears to be no complete record of general aviation incidents of a similar kind.

and flying should be safer beside other things. Putting a price on such changes is not easy. The Federal Aviation Administration has put a value of \$200 million on the identifiable benefits to the sector, but argues that wider benefits are extensive. Additionally, given the massive heterogeneity of the general aviation fleet, there will inevitably be wide variations across beneficiaries. What this should also be set against, and to my knowledge has not been to date, is the current situation whereby general aviation uses approximately 16 percent of air traffic control services but contributes only 3 percent of the costs¹⁰.

But what is often missed in these types of very static calculations is the allocation of costs during a transition when operating both radar and satellite based systems. As transfer takes place the amount of traffic using primary surveillance will decline while that using ADS-B based systems, and especially when ADS-B In is widely adopted, will increase implying a much higher cost burden being placed on those using radar surveillance. The burden, for example, of the radar-based system on general aviation would increase significantly if scheduled airlines moved to comprehensive ADS-B navigation systems.

PAYMENT FOR THE SYSTEM

There is no-such thing as free lunch, and moving to satellite based air navigation requires resources. In particular, unlike primary radar-based surveillance, full ADS-B requires equipping aircraft so that they can interact with other aircraft and ground installations in much wider range of ways. This means that its use involves two distinct costs to users; one to reflect the infrastructure costs involved and another the costs of the on-board equipment.

The costs of equipping a plane varies according to such things as whether it is a retrofit, whether it includes both ADS-B Out and In, or just the former, and the extent to which equipment offers information beyond that required for certification. Given these facts, the estimated costs range from \$4,000 to \$17,000 to equip an aircraft with ADS-B Out, although in the case of new aircraft there is the off-setting cost of a saving from not having a separate transponder fitted. The costs of ABS Out and In equipment has been estimated to cost up to \$30,000. In addition, there are annual costs associated with the ground infrastructure of the system and, in the short-term, of operating the current radar surveillance system. There is certainly no consensus on the aggregate costs involved; e.g. a Federal Aviation Administration estimate suggests that the cost to equip general aviation aircraft from 2012 to 2035 would range anywhere from \$1.2 to \$4.5 billion.

There has been little market-based incentive for early adoption of a new technology like ADS-B where many of the benefits are not immediate. Indeed, the reverse is almost the case because the main gains come after widespread adoption and “first movers” have the burden of having equipped with only partially useful equipment; the network economies take time to be realized.

¹⁰ US DEPARTMENT OF TRANSPORTATION'S INSPECTOR GENERAL OFFICE, *Use of the National Air Space System*, CR-2008-028, Washington DC, 2008.

There is some intended financial support for general aviation from the NextGen GA Fund¹¹ to help up-grade existing aircraft to meet the Federal Aviation Administration's 2020 deadline. The fund is a public-private partnership between the United States Congress, the aerospace industry and the private-sector investment community. It began with a capital base of \$550 million with the intention of eventually provide some \$1.3 billion in financing to the general aviation sector over 10 years. It is focused on the more costly retrofits; those of over \$10,000. This measure, however, has come some time after the notification of the 2020 requirement, and thus has done little to stimulate early adoption of the necessary avionics.

In addition to the money costs of fitting ADS-B In there is in the case of the existing general aviation fleet, the time costs of retrofitting that can take from a day or so to more than a week. For those elements of the fleet that are used for such as training, taxi, charter, and business travel this is a *de facto* financial cost as aircraft are out of action. Additionally, while many flights may fall outside of the Federal Aviation Administration's 2020 requirement, there will inevitably occasions when planes that are normally used at lower altitudes will be brought within the ADS-B threshold. This means that for users of these aircraft there will be a requirement for ADS-B Out equipment that is not always needed, and maybe seldom needed; "portable" equipment is not really an option.

THE PHASING-IN OF ADS-B

The United States has chosen a particular path for phasing in ADS-B, it is not the only possible way of doing this and some other countries have taken different routes; the differences may be due the underlying objectives sought, the nature of the traffic, or the broader institutional structures involved.

While NextGen entails large scale infrastructures investment, the United States aircraft fleet is both large and diverse and the Federal Aviation Administration has sought to embrace a large part of this fleets' use of airspace as one action by mandating it an make use of the ADS-B system. The creation of the ground infrastructure began in August 2007 when the FAA awarded ITT Corp. a contract to develop and build a nationwide network of 794 ADS-B ground stations. This is also essentially what is happening in Europe, with planes with a weight above 12,600lb or a max cruise of over 250 knots being required to carry ADS-B from 2017, and new planes from 2015 (originally this was 2015 and 2013 respectively but there has been slippage). This has all the pros-and-cons of any big-bang strategy (actually more of a medium bang because ADS-B In is not included.) with high set-up costs but a relatively quick flow of benefits and more solid information to help individual actors make decisions.

The approach helps shorten the transition tot he satellite based systems, and gives a clear target for those involved. The latter is not just important for aircraft users but also for those that manu-

¹¹ <http://www.nextgenfund.com/>

facture the hard and software that is required on the plane and ground, and those that conduct the equipage of the existing fleet. It removes some of the production uncertainties and allows the build-up of necessary equipage capacity. In the long-run it is likely that all aircraft will require to be fitted with at least ADS-B Out, and possibly ADS-B In, equipment and advanced notice would allow new aircraft to be prepared for this, and lessen the costs of retrofitting. This latter factor can reduce the costs of producing the hardware and lead to greater diversity in the products offered; a number of alternative models become financially viable to produce. Added to this, a substantial market has room for a large number of suppliers thus keeping up competitive pressures and minimizing prices.

The evidence of retrofitting the United States general aviation fleet is that to-date progress has been slow. Data from the Federal Aviation Administration suggest that by early 2014 less than 1,500 aircraft met certification requirements. This is well below the trend required to meet the 2020 target, although some caveats should be taken into account. First, not all the planes that are ultimately likely to fly in the designated ADS-B Out required airspace will need to do so by January 1st 2020, and some of the existing fleet will be out of service by that date anyway for other reasons.¹² Second, the existing equipage facilities are likely to be expanded as demand increases for retrofitting; this is, after all, a commercial activity with financial rewards coming from the equipage service. Third, there is some general evidence from other areas that when there are mandatory requirements, economies of experience have some effect with both money and time costs of installing a new technology at the micro-level falling as more operations are completed.

Other countries have adopted slightly different road maps for change. Canada has essentially adopted more of what may be called a “geographical spread system” under which ADS-B capacity has been provided over some areas that have no radar surveillance, e.g. the Hudson Bay where separation has been reduced from 80 nautical miles to five. A variation on this theme is to spread the technology vertically, beginning say with A and B airspace, this similar to the Australian approach. The underlying problem with all these approaches is that underlying any significant change in air navigation, and indeed in any transportation sector, namely that users are not static and many move between parts of the overall system.

CONCLUSIONS

Changing any air navigation system is difficult, not least because the existing structure cannot be closed down while the new is introduced. The United States, with the world’s largest air transportation system, typifies the sorts of compromise that have to be made in piecemeal change. The hope is that NextGen will, once

¹²The United States active general aviation fleet fell from 223,700 to 209,034 between 2010 and 2013, although the Federal Aviation Administration forecasts growth as economic recovery takes place. The degree to which this growth will involve the new entry of aircraft to the United States fleet will affect retrofitting needs.

fully in place, provide a more flexible long-term framework within which air traffic can grow efficiently to the benefit of the country. Nevertheless, the change has not been proving easy, and never seemed likely to be.

The move to the use of satellite surveillance represents a significant improvement to air navigation, filling gaps in the existing radar based systems and offering enhanced and faster information flows. While the initial adoption of ADS-Out in the United States will provide only some of the potential benefits of a full ADS system it, nevertheless, will impact positively in terms of safety and more efficient use of air space; there seems to be general agreement on this. The costs to both the aviation sector and taxpayer are not small, and the expenses of retrofitting part of the general aviation fleet to meet new certification standards by 2020 are equally far from negligible. It is perhaps unfortunate that incentives for early adoption have been slow to transpire, but firm mandates have been shown to stimulate market responses that allow targets to be met.

Questions from Members of the Committee on Small Business

Rep. Judy Chu (CA-27) Question for the Record

**Small Business Committee Hearing: FAA's 2020 NextGen Mandate:
Benefits and Challenges for General Aviation**

Question for FAA Administrator, Michael Huerta

Hearing date: June 11, 2014

We're here today to talk about how we can help small businesses operate in the NextGen space. In addition, I am concerned with the fact that it has been a struggle to achieve the government-wide 23% goal of federal contracts that should be awarded to small business.

I have a minority-owned, small business in my district that is involved in the NextGen movement. Located in Claremont, CA, NBP has worked with the FAA for the past 40 years. They are evolving the existing legacy equipment to NextGen, specifically, the Integrated Control Monitoring System (ICMS), that monitor and control navigational and visual aids on the airfield. In fact, their ICMS system is installed in 15 airports across the country, which includes some of our busiest airports like Chicago O'Hare and Atlanta. It has been operating for over 12 years and has a great safety record.

However, in March of this year, the VP of Technical Operations Services at the FAA, Mr. Vaughn A. Turner, issued a Memorandum that stated the FAA would "not support any new installations of ICMS, maintenance and logistics of the ICMS in the National Airspace System." Instead, the memo states that the FAA recommends "installation of the Universal Interlock Controller (UIC) in lieu of ICMS." The UIC, the memo states, is an "FAA-developed system and has FAA-provided logistics, training" and support.

Question 1:

To me, it sounds like the FAA is in direct competition with a small business in my district. Can you tell me if the FAA has a plan for developing or using this type of technology—similar to the ICMS?

FAA Response:

The FAA's policy, consistent with OMB mandates, is not to compete with the private sector in the provision of goods and services. When alternatives are available, the FAA strives to return the greatest value to the taxpayer. In this instance, the FAA has an existing system that uses different technology to perform Instrument Landing System (ILS) control, interlock, and monitoring functions. The FAA began developing this system in 2005 and it is operational at 12 airports. Engineering to expand these functions to include monitor and control of other navigational aids beyond ILS began in 2011. The decision to use the existing system took

into account the fact that the government already owned a highly reliable and safe infrastructure that can be deployed, maintained, and enhanced very cost effectively.

Question 2:

Small business is the backbone of America and it's what keeps our country working. This is why we must continue supporting policies and actions that support the growth of small businesses, particularly those like NBP that have a performance record in delivering quality products. Now, I understand that NBP has been working with the FAA for the past few months to address issues that were raised by FAA's officials. They recently met with Chief Operating Officer, Teri Bristol, and the VP of Technical Operations, Vaughn Turner. Could you provide any updates on this situation?

FAA Response:

The FAA maintains a very robust small business program and has met or exceeded government-wide small business goals in all categories for years. Part of our program is providing access at all levels to small businesses that want to discuss concerns and opportunities for contracting with the FAA. We appreciate the opportunity to meet with NBP to discuss their concerns, and there will be subsequent discussions in the near future.

Rep. Grace (NY-6) Questions for the Record**Small Business Committee Hearing: FAA's 2020 NextGen Mandate:
Benefits and Challenges for General Aviation****Question for FAA Administrator, Michael Huerta****Hearing date: June 11, 2014**

Administrator Huerta -

Thank you for being here today.

As you know, my constituents have had many struggles with airplane noise. I represent a district that is between LaGuardia and JFK, an area that is in the busiest air space in the country. With new route procedures, such as TNNIS, the NextGen mandate, Airspace Redesign, and now the Metroplex study on the horizon, it's difficult to make sense of what the FAA is really working on at this moment.

When the TNNIS procedure was made permanent, the FAA erred by not informing the community and elected officials. Since then, communication with the FAA has been better, but still has room for improvement. Dennis Roberts, the Director of Airspace Service at the Air Traffic Organization, said in a recent briefing that the recently established New York Airport Roundtables would be helpful for the FAA to communicate with our communities. These roundtables were created because of community advocacy and my work soon after coming to Congress. Although 11 other major airports had these roundtables, New York City was left without a proper venue for community concerns. I ask that FAA use these roundtables to ensure my constituents are kept up to date with any changes and new information from the FAA. I am pleased, and I'm sure my constituents are as well, that the Metroplex studies will use one Environmental Assessment or Environmental Impact Statement when analyzing the air space. This is a marked improvement over individual airports being studies, as the proximity of the airports should not be ignored.

I also ask that as Phase 1 of Metroplex is initiated in January, 2015, that the LaGuardia and Kennedy Roundtables receive consistent updates.

Question 1:

Please let me and my office know of how we can be helpful with this process. The noise pollution over my district is a top concern, and I want to work with the FAA to remedy these problems as quickly as possible.

FAA Response:

The FAA has had positive experiences in other metropolitan areas with community-based roundtables. As we stated at the JFK-LGA meeting on June 18, 2014, the FAA commends the NYNJPA and community representatives for the establishment of the roundtables for the three major New York metropolitan airports. These forums provide a venue whereby communities, the NYNJPA

and the FAA alike can share information and work toward resolution of issues. The FAA will collaborate with the NYNJPA, as sponsors of the Roundtables, making its leadership available to share updates on the NY Metroplex project as it takes shape. The FAA appreciates the support your office has offered with this important project.

Question 2:

One of the biggest benefits of the NextGen Initiative will be reducing the environmental impacts of noise and emissions. Can you explain how the 2020 Mandate reduces carbon emissions and reduces noise pollution around airports?

FAA Response:

The 2020 ADS-B Out mandate will impact noise and emissions through the following capabilities:

- Increased ability to fly Optimal Profile Descents (OPDs) through initial application of Ground-based Interval Management - Spacing (GIM-S)
 - The goal of the GIM-S tool is to increase OPD use at major NAS airports; OPDs have been shown to decrease emissions and decrease noise for some noise sensitive areas during arrival and approach
- More efficient en route metering and conflict resolution using ADS-B in the User Request and Evaluation Tool (URET) and Traffic Management Advisor (TMA)
 - The improved accuracy of ADS-B as an input to decision support tools, such as URET and TMA, provides for more efficient operations.
- More efficient ATC management of surface movement using the ADS-B Surface Surveillance Capability (ASSC)
 - The ASSC tool will also decrease carbon emissions on the surface at the airports where implemented.
- More efficient spacing and optimal routing in non-radar environments (Gulf of Mexico, Mountainous Regions of Colorado, low-altitude Alaska)
 - Even in non-radar regions, aircraft equipped due to the rule may impact noise and emissions. For example, the primary helicopter operator in the Gulf of Mexico has reported a noticeable reduction in noise complaints surrounding regional heliports after ADS-B surveillance was implemented. The increase in IFR services after ADS-B implementation has driven an increase in the use of higher altitude Instrument Flight Rules (IFR) routes that are relatively quiet as compared to lower altitude Visual Flight Rules (VFR) trajectories.

All of the capabilities mentioned above reduce fuel burn and the requisite carbon emissions. The estimates performed for the rule-making suggested a decrease near 18 million tons of carbon dioxide by 2035.

Rep. Mike Mulvaney (SC-5) Question for the Record**Small Business Committee Hearing: FAA's 2020 NextGen Mandate:
Benefits and Challenges for General Aviation****Question for FAA Administrator, Michael Huerta****Hearing date: June 11, 2014**

Mr. Huerta, the FAA has ruled that aircraft operators equip for ADS-B Out by 2020. However, a follow-on requirement for ADS-B In was sidetracked when an FAA aviation rulemaking committee (ARC) concluded that the required multi-billion-dollar investment by airline and general aviation operators cannot be justified at the present time.

Question 1:

In order to ensure sufficient buy-in by airline operators, do you plan to lay out the business case for ADS-B In and other long-term NextGen programs?

FAA Response:

In order to develop the business cases and ensure buy-in for the aviation community, the FAA has used Other Transaction Agreements (OTAs) to help expedite early adoption of ADS-B by air carriers. Through OTAs with industry partners, the agency is able to demonstrate real benefits of advanced ADS-B In applications and procedures while allowing the FAA to share costs and risks with the participants. The use of ADS-B In applications will give the agency and airlines detailed cost and benefit data, and encourage other airlines and operators to equip early to capitalize on ADS-B benefits. For example, in 2009, the agency began a partnership with United Airlines to demonstrate an ADS-B In-Trail Procedures application in the Oakland Oceanic Flight Information Region. An operational evaluation of this capability is ongoing. This demonstration has validated the equipment performance standards that were published in 2011. In May 2012, the FAA made the decision to fund the integration of In Trail Procedures into the automation system for use by air traffic controllers. This will fully be operational in 2017.

Based on ADS-B-In application research and feedback from the Aviation Rulemaking Committee (ARC), the major near-term benefits from ADS-B-In will be generated by Interval Management applications. Current FAA plans call for an Investment Analysis Readiness Decision for changes to the automation systems to support Interval Management to occur this year, with a Final Investment Decision to occur in 2016. If these investment decisions are made on this schedule, then FAA would expect to be able to commence support of Interval Management operations by 2020–2021. Interval Management avionics could be available in the 2017–2020 timeframe.

Question 2:

Given your background in the private sector, are you persuaded that airlines today will receive a return on their investment on NextGen equipage? Why or why not?

FAA Response:

Airlines that have chosen to equip and use NextGen technologies are already seeing a significant return on their investment. US Airways, for example, is saving \$14.7 million per year using Optimized Profile Descents at its hub in Phoenix. JetBlue is using ADS-B routes over the Gulf of Mexico to avoid lengthy reroutes around thunderstorms, thereby meeting scheduled arrival times. Horizon Air is using RNAV GPS (WAAS LPV) approaches that enable consistent access to small airports, thus avoiding cancellations and delays, and is annually saving 500,000 gallons of fuel. Horizon has equipped its entire fleet with WAAS. Alaska Airlines is using RNP approaches into Juneau and is saving \$15 million a year by avoiding cancellations and delays. Because airlines have different operating models for their businesses, it's hard to pinpoint when a particular airline will recoup its investments for NextGen equipage. Some airlines may choose to invest in equipping its entire fleet with the full suite of NextGen technologies and the training to use those technologies. Others may choose to equip and train differently, depending on the services that they provide.

NextGen benefits will accrue as more aircraft become equipped because the national airspace system will overall operate more efficiently. There is a direct correlation between equipage levels and NextGen system benefits.

Question 3:

Mr. Huerta, as you know, the U.S. aviation industry has lost billions of dollars and hundreds of thousands of jobs over the last decade. While our commercial and general aviation industries are recovering, I'm concerned that these gains could be mitigated by the tax increases and regulatory policies advocated by this administration. The President's FY 2015 budget included over \$4 billion in new or higher aviation taxes and fees, including a new \$100 per aircraft departure fee that is projected to cost operators \$1 billion annually.

What is your position and that of the DOT on the proposed increases in the industry's taxes and regulations? Do you think these taxes and regulations undermine the global competitiveness and economic viability of our aviation industry? Why or why not?

FAA Response:

The FAA recognizes the critical role aviation plays in supporting jobs and generating significant economic activity for the country. Aviation is a global industry and we have to continue our heritage as world leaders in aviation and setting the safety standard for others to measure against and engage our partners internationally. The FAA's mission is to provide the safest and most efficient aerospace system in the world. In promulgating new regulations, the agency considers the impact on affected users and industry. We rely primarily on excise taxes and fees collected from users of the national airspace to fund the FAA. In order to more equitably dis-

tribute the cost of air traffic services across the aviation community, the Administration proposes in the FY15 Budget Request to Congress that the Department of Transportation establish a new surcharge for air traffic services of \$100 per flight. Military aircraft, public aircraft, piston aircraft, air ambulances, aircraft operating outside of controlled airspace, and Canada-to-Canada flights would be exempt. The revenues generated by the surcharge would be deposited directly into the Airport and Airway Trust Fund. The health of the Trust Fund is critical to ensuring FAA's ability to fulfill our mission and serve our diverse set of aviation stakeholders, most importantly the traveling public, but also industry.

Other fees beyond the \$100 per flight air traffic services fee that the Administration has proposed on the aviation industry pertain to the Department of Homeland Security.

As part of the upcoming Reauthorization, the FAA looks forward to working with Congress and aviation stakeholders on funding and other policy issues.



June 11, 2014

The Honorable Sam Graves
 Chairman, Committee on Small Business
 U.S. House of Transportation
 2361 Rayburn House Office Building (RHOB)
 Washington, D.C. 20515

The Honorable Nydia Velazquez
 Ranking Member
 Committee on Small Business
 U.S. House of Representatives
 Washington, D.C. 20515

Dear Chairman Graves and Ranking Member Velazquez:

On behalf of the National Business Aviation Association (NBAA) and our more than 10,000 Member Companies, I am writing to commend you for your hearing today to explore the Federal Aviation Administration's (FAA's) 2020 mandate, related to the transformation of the U.S. aviation system to a modernized, Next Generation ("NextGen") system, and what the benefits and challenges will be for small businesses in the general aviation community, as the industry seeks to comply with the FAA's mandate.

Your hearing's focus on the application of the FAA's mandate to small businesses is appropriate – as you know, most companies that use an aircraft to help meet their transportation needs are small and mid-sized businesses operating just one airplane. In fact, for every Fortune 500 company that relies on turbine-powered business aviation, there are about eight small enterprises doing so.

At the same time, your hearing holds value for NBAA Member Companies of all sizes, because the entire business aviation community wants to ensure that America's aviation system remains the world's safest, largest and most efficient system. In fact, modernization is such a priority to NBAA and its Members that the association has staff representation on all the major NextGen government-industry working groups. We know that a modernized system will boost its capacity – something especially important to business aviation, because we have seen that when airspace and airports become constrained, business aviation tends to get pushed out of those areas.

As the committee knows, and as you noted in your opening statement for today's hearing, Automatic Dependent Surveillance-Broadcast (ADS-B) has been identified as one of the key technologies for the transition from a ground-based, analog system, to a NextGen system that is satellite-based and digital.

The move to ADS-B and other NextGen technologies is intended to greatly advance operational efficiency, safety, and the continuing work to reduce the industry's environmental footprint. The satellite-based navigation and positioning information provided by ADS-B is intended to permit an operator to determine the exact position of the aircraft to controllers, and to other aircraft as well.

As you know, ADS-B accomplishes this through two components: ADS-B "In" and ADS-B "Out." ADS-B "In" permits pilots to receive "real-time" information on the location of other aircraft and operating data on their own aircraft, as well as "situational awareness" in relation to other air traffic in the area. ADS-B "Out" will continuously transmit an aircraft's position, altitude and direction to air traffic controllers.

That said, for all the promise of ADS-B and other NextGen technologies, there are potential, significant challenges in obtaining the technologies, and it's clear that more detail is needed from the FAA on the key specifics behind the agency's ADS-B mandate.

For example, the industry needs further clarity on the FAA's implementation timeline – including the agency's requirement for ADS-B equipage by January 1, 2020 – and what is required of operators to meet that timeline. We need a better understanding of what type of commitment operators must make for technology upgrades and new investments. As with all new programs, we also have concerns about what the equipage costs for operators will be, and what services can be expected from installation of ADS-B and other NextGen equipment.

NBAA and its Member Companies thank you and your fellow committee members for holding this hearing, so that these and other important considerations can be aired as part of NextGen modernization – a priority we all share.

Sincerely,



Ed Bolen
President and CEO
National Business Aviation Association

